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Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

UET20319 Certificate II in ESI - Powerline Vegetation Control

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Powerline Vegetation Control Worker.

This qualification covers competencies for the operational role of planning and carrying out vegetation control at and above ground level near live electrical apparatus. It also includes complying with relevant legislation, applicable industry guidelines, codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

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 70 **weighting points** can be taken from Group A; and **between 50 and 120 weighting points** taken from Group B. You may select all your elective from this group.

Up to 70 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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide (link below), if not listed weighting points will be 10 points.

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

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Core units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UETTDREL13	Comply with sustainability, environmental and incidental response policies and procedures	40
UETTDREL14	Working safely near live electrical apparatus as a non-electrical worker	40
UETTDRVC23	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	60
UETTDRVC27	Monitor safety compliance of vegetation control work in an ESI environment Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker ∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	60

Group A: Imported and common elective units		**Weighting Points**
AHCARB312	Use standard climbing techniques to access trees ∟AHCARB311 Tie, dress, set and finish arborist knots	20
AHCCHM201	Apply chemicals under supervision	30

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AHCMOM304	Operate machinery and equipment	40
AHCPCM201	Recognise plants	40
AHCPCM203	Fell small trees ∟AHCMOM213 Operate and maintain chainsaws	30
FWPHAR2206	Operate a mobile chipper/mulcher	20
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40

Group B: Qualification elective units		**Weighting Points**
UETTDRVC21	Use climbing techniques to cut vegetation above ground near live electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker ∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus ∟UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment ∟UETTDRVC33 Apply pruning techniques to vegetation control near live electrical apparatus ∟UETTDRVC34 Undertake release and rescue from a tree near live electrical apparatus	30
UETTDRVC24	Assess vegetation and recommend control measures in an ESI environment Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical	80

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	apparatus as a non-electrical worker ∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus ∟UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment	
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UETTDRVC26	Cut vegetation at ground level near live electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker ∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus ∟UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment	60
UETTDRVC31	Operate specialist equipment at ground level near live electrical apparatus Common Unit Group	60

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	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	
	∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	
	∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	
	∟UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment	
UETTDRVC32	Use specialised plant to cut vegetation above ground level near live electrical apparatus	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	
	∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	
	∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	
	∟UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment	
	∟UETTDRVC33 Apply pruning techniques to vegetation control near live electrical apparatus	
UETTDRVC33	Apply pruning techniques to vegetation control near live electrical apparatus	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	
	∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	
	∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	

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	∟UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment	
UETTDRVC34	Undertake release and rescue from a tree near live electrical apparatus	20
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	
	∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	
	∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	
	∟UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment	

Qualification Mapping Information

This qualification replaces and is equivalent to UET20312 Certificate II in ESI – Powerline Vegetation Control

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET20419 Certificate II in Transmission Structure and Line Assembly

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Transmission Line Assembly Worker.

This qualification covers assembling transmission towers and structures. It also includes stringing transmission overhead conductors prior to being tensioned.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

^ From 1 July 2022 the elective units HLTAID001, HLTAID003 must no longer be delivered and will be replaced in the Packaging Rules by the unit HLTAID009, HLTAID011 - for more information see:
https://asqa.gov.au/news-events/news/reminder-about-superseded-hlt-first-aid-units

Entry Requirements

There are no entry requirements for this qualification.

Packaging Rules

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

160 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 140 and 200 **weighting points** taken from Group B. You may select all your elective from this group.

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 UET Transmission, Distribution

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and Rail Sector Training Package Companion Volume Implementation Guide, if not listed, weighting points will be 10 points.

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

Core units		**Weighting Points**
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UETTDREL13	Comply with sustainability, environmental and incidental response policies and procedures	40
UETTDRTP23	Erect power systems transmission structures Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	100

Group A: Imported and common elective units		**Weighting Points**
AHCMOM304	Operate machinery and equipment	40
CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
^ HLTAID009	**Provide cardiopulmonary resuscitation (must be delivered from 1 July 2022)**	
HLTAID003	Provide first aid	10
^ HLTAID011	**Provide First Aid (must be delivered from 1 July 2022)**	
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40

Group B: Qualification elective units		**Weighting Points**
UETTDRTP22	Establish and reinstate a power systems transmission structure work site Common Unit Group ∟UEENEEE101A Apply Occupational Health and	80

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	Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	
UETTDRTP24	Erect power systems transmission structure hardware Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDRTP23 Erect power systems transmission structures	60
UETTDRTP25	Pre-tension stringing overhead transmission conductors and cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDRTP23 Erect power systems transmission structures ∟UETTDRTP24 Erect power systems transmission structure hardware	80

Qualification Mapping Information

This qualification replaces and is equivalent to UET20412 Certificate II in Transmission Structure and Line Assembly

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET20519 Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to install and maintain National Broadband Network (NBN) cabling on the electricity supply industry (ESI) assets.

This qualification covers the installation and maintenance of the NBN network communications cabling infrastructure following prescribed routines.

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

^ From 1 July 2022 the elective unit HLTAID001 must no longer be delivered and will be replaced in the Packaging Rules by the unit HLTAID009 - for more information see: https://asqa.gov.au/news-events/news/reminder-about-superseded-hlt-first-aid-units

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** taken from Group B. You may select all your elective from this group.

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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified

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are complied with.

Core units		**Weighting Points**
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETTDREL14	Working safely near live electrical apparatus as a non-electrical worker	40
UETTDRIS81	Install telecommunications infrastructure on electricity supply industry assets Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	80

Group A: Imported and common elective units		**Weighting Points**
CPCCCM2007	Use explosive power tools ∟CPCCWHS2001 Apply WHS requirements, policies and procedures in the construction industry	15

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CPCCWHS1001	Prepare to work safely in the construction industry	10
HLTAID001	Provide cardiopulmonary resuscitation	10
^ HLTAID009	**Provide cardiopulmonary resuscitation (must be delivered from 1 July 2022)**	
RIIWHS202D	Enter and work in confined spaces	30
RIIWHS204D	Work safely at heights	20
RIIWHS205D	Control traffic with stop-slow bat	10
TLID3035	Operate a boom type elevating work platform	30
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	30
UEENEEC001B	Maintain documentation	20
UEENEEC008B	Receive and store materials and equipment for electrotechnology work	20
UEENEEC010B	Deliver a service to customers	20

Group B: Qualification elective units		**Weighting Points**
ICTCBL208	Splice and terminate optical fibre cable for carriers and service providers	40
ICTCBL210	Install a telecommunications service to a building	60
UEENEEE103A	Solve problems in ELV single path circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE151A	Transport apparatus, equipment and materials	60
UEENEEF106A	Solve problems in voice and data communications circuits ∟UEENEEE101A Apply Occupational Health and	40

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	Safety regulations, codes and practices in the workplace	
UEENEEF107A	Set up and configure the wireless capabilities of communications and data storage devices	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UETTDREL12	Operate plant and equipment near live electrical conductors and apparatus	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL16 Working safely near live electrical apparatus	

Qualification Mapping Information

This qualification replaces and is equivalent to UET20511 Certificate II in National Broadband Network Cabling (Electricity Supply Industry Assets)

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET20619 Certificate II in ESI - Asset Inspection

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as an Asset Inspector.

This qualification covers safely complying with relevant legislation, industry standards, codes of practice or other related requirements while inspecting and reporting on the status of distribution assets, including poles and structures, cables, overhead conductors, public lighting, security fencing and gates, insulators and transformers. It includes minor maintenance and weed control.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

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** taken from Group B. You may select all your elective from this group.

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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide (link below), if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified

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are complied with.

Core units		**Weighting Points**
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UETTDREL13	Comply with sustainability, environmental and incidental response policies and procedures	40
UETTDREL14	Working safely near live electrical apparatus as a non-electrical worker	40
UETTDREL17	Operate asset inspection machinery and equipment near live electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	40
UETTDREL18	Inspect and treat poles and inspect electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	40
UETTDREL19	Identify and interpret characteristics of electrical apparatus associated with power industry assets Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical	40

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	apparatus as a non-electrical worker	

Group A: Imported and common elective units		**Weighting Points**
CPCCWHS1001	Prepare to work safely in the construction industry	10
MEM16012A	Interpret technical specifications and manuals	40
MEM17003A	Assist in the provision of on the job training	20
UEENEEC001B	Maintain documentation	20
UEENEEC010B	Deliver a service to customers	20
UEENEED101A	Use computer applications relevant to a workplace	20
	∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace.	

Group B: Qualification elective units		**Weighting Points**
UETTDREL20	Undertake minor vegetation control and routine minor maintenance of poles and electrical apparatus	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	
	∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	
	∟UETTDREL17 Operate asset inspection machinery and equipment near live electrical apparatus	
UETTDREL21	Operate specialised data information equipment near live electrical apparatus	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures	
	∟UETTDREL14 Working safely near live electrical	

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	apparatus as a non-electrical worker	
UETTDRVC23	Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker	60
UETTDRVC27	Monitor safety compliance of vegetation control work in an ESI environment Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures ∟UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker ∟UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	60

Qualification Mapping Information

This qualification replaces and is equivalent to UET20612 Certificate II in ESI – Asset Inspection

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET30519 Certificate III in ESI - Power Systems - Transmission Overhead

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skill and knowledge to work in the electricity supply industry (ESI) as an as an Overhead Transmission Linesperson.

This qualification covers work on transmission overhead powerlines, such as the erection of towers, poles, structures and associated hardware, and the installation and maintenance of conductors and cables. It also includes inspection procedures for overhead structures and electrical apparatus.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

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

840 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 70 **weighting points** can be taken from Group A; and between 160 and 220 **weighting points** taken from Group B. You may select all your elective from this group.

Up to 70 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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

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

Core units		**Weighting Points**
CPCCLDG3001A	Licence to perform dogging	20
CPCCLRG3001A	Licence to perform rigging basic level ∟CPCCLDG3001A Licence to perform dogging	40
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic	80

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	devices and related circuits	
UETTDREL11	Apply sustainable energy and environmental procedures	20
UETTDREL12	Operate plant and equipment near live electrical conductors and apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL16 Working safely near live electrical apparatus	40
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS54	Install and maintain poles, structures and overhead conductors and cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	60
UETTDRTP26	Install transmission structures and associated hardware Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment	60

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	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRTP27	Maintain transmission structures and associated hardware	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRTP26 Install transmission structures and associated hardware	
UETTDRTP29	Install and maintain transmission overhead conductors and cables	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRTP26 Install transmission structures and	

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	associated hardware ∟UETTDRTP27 Maintain transmission structures and associated hardware	
UETTDRTP30	Inspect transmission overhead structures and electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	40
UETTDRTP99	Test and verify transmission overhead installations 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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables ∟UETTDRTP26 Install transmission structures and	40

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	associated hardware	
	∟UETTDRTP27 Maintain transmission structures and associated hardware	
	∟UETTDRTP29 Install and maintain transmission overhead conductors and cables	
	∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus	

Group A: Imported and common elective units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3002A	Licence to perform rigging intermediate level	60
	∟CPCCLRG3001A Licence to perform rigging basic level	
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	20
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding intermediate level	20
	∟CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level	
TLILIC0002	Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)	40
TLILIC0003	Licence to operate a forklift truck	40
TLILIC2015	Licence to drive a medium rigid vehicle	20
TLILIC2016	Licence to drive a heavy rigid vehicle	20
TLILIC0006	Licence to operate a bridge and gantry crane	70
TLILIC0010	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC0013	Licence to operate a slewing mobile crane (up to 60 tonnes)	70

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TLILIC0015	Licence to operate a slewing mobile crane (over 100 Tonnes)	70
UEENEEE108A	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

Group B: General elective units		**Weighting Points**
UETTDRDP11	Inspect overhead poles-structures and electrical apparatus	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRDP12	Maintain overhead energised low voltage conductors and cables	60
	Common Unit Group	

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	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRIS41	Install network infrastructure electrical equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and	

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environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟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

∟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

∟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

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	∟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	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS42	Maintain network infrastructure electrical equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟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	

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overhead conductors and cables

Distribution Overhead Pathway Group

∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables

∟UETTDRIS41 Install 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

∟UETTDRIS41 Install network infrastructure electrical equipment

∟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

∟UETTDRIS41 Install network infrastructure electrical equipment

∟UETTDRIS55 Install and maintain low voltage underground services

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UETTDRIS43	Perform low voltage field switching operation to a given schedule	50

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

∟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

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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

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	∟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 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	
UETTDRIS44	Perform HV field switching operation to a given schedule	50
	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.	

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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

∟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

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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 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

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	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	
UETTDRIS52	Install and maintain poles, structures and associated hardware Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	50
UETTDRIS53	Install and maintain power system public lighting 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.	40

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circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟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

∟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

∟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

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	∟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	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS56	Install and maintain low voltage overhead services	40
	Electrotechnology Electrician	
	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	

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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

∟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

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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

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	∟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	
	Electrotechnology Electrician 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	
UETTDRIS57	Conduct visual checking and treatment of power system poles and structures	30
	Electrotechnology Systems Electrician	
	Common Unit Group	

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∟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

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟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

∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus

Distribution Overhead Pathway Group

∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables

∟UETTDRIS41 Install network infrastructure electrical equipment

∟UETTDRIS42 Maintain network infrastructure electrical equipment

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	∟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	
	∟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	
	∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS61	Install mobile generation set for synchronised LV Genset	50
	Electrotechnology Electrician	
	Common Unit Group	

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∟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

∟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

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∟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

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	underground services	
	Electrotechnology Electrician 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	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	
UETTDRSB39	Perform power system substation switching operation to a given schedule	50
	Electrical	
	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	

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∟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

∟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

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∟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 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

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	∟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	
UETTDRVC29	Control vegetation whilst performing linework	40
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	

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Qualification Mapping Information

This qualification replaces and is equivalent to UET30512 Certificate III in ESI – Power Systems – Transmission Overhead

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET30619 Certificate III in ESI - Power Systems - Distribution Overhead

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as an Overhead Distribution Linesperson.

This qualification covers work on distribution overhead powerlines, including installation, maintenance and inspection of poles, structures and associated hardware. It also includes installation and maintenance of electrical equipment, conductors and cables used in the powerline industry and the use of support plant and equipment to undertake these tasks and environmental requirements.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

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 70 **weighting points** can be taken from Group A; and between 80 and 140 **weighting points** taken from Group B. You may select all your elective from this group.

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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed

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weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure that all prerequisite units specified are complied with.

Core units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
CPCCLDG3001A	Licence to perform dogging	20
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	80

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
UETTDRDP11	Inspect overhead poles-structures and electrical apparatus	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRDP12	Maintain overhead energised low voltage conductors and cables	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures	

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	and overhead conductors and cables	
UETTDRDP99	Test and verify distribution overhead installations	40
	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	
	∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus	
	∟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	
	∟UETTDREL16 Working safely near live electrical 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	
UETTDREL11	Apply sustainable energy and environmental procedures	20

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UETTDREL12	Operate plant and equipment near live electrical conductors and apparatus	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS41	Install network infrastructure electrical equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRTP26 Install transmission structures and associated hardware	
	∟UETTDRTP27 Maintain transmission structures and	

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	associated hardware	
	∟UETTDRTP29 Install and maintain transmission overhead conductors and cables	
	Distribution Overhead Pathway Group	
	∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables	
	∟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	
	∟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	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS42	Maintain network infrastructure electrical equipment	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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∟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

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟UETTDRIS41 Install network infrastructure electrical equipment

∟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

∟UETTDRIS41 Install 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

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	Rail Traction Pathway Group	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟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	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS52	Install and maintain poles, structures and associated hardware	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS54	Install and maintain poles, structures and overhead conductors and cables	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS56	Install and maintain low voltage overhead services	40
	Electrotechnology Electrician	
	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	

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environmental procedures

∟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

∟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

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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

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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

Electrotechnology Electrician 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

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

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CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3001A	Licence to perform rigging basic level	40
	∟CPCCLDG3001A Licence to perform dogging	
CPCCLRG3002A	Licence to perform rigging intermediate level	60
	∟CPCCLRG3001A Licence to perform rigging basic level	
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	20
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding intermediate level	20
	∟CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level	
TLILIC0002	Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)	40
TLILIC0003	Licence to operate a forklift truck	40
TLILIC2015	Licence to drive a medium rigid vehicle	20
TLILIC2016	Licence to drive a heavy rigid vehicle	20
TLILIC0006	Licence to operate a bridge and gantry crane	70
TLILIC0010	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC0013	Licence to operate a slewing mobile crane (up to 60 tonnes)	70
TLILIC0015	Licence to operate a slewing mobile crane (over 100 Tonnes)	70
UEENEEE108A	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	

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	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

Group B: General elective units		**Weighting Points**
UETTDRIS43	Perform low voltage field switching operation to a given schedule	50
	Electrical	
	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

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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

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

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	sustainable procedures in the energy sector	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRIS44	Perform HV field switching operation to a given schedule	50
	Electrical	
	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	
	∟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	

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∟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

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	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 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	
UETTDRIS53	Install and maintain power system public lighting	40
	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,	

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standards, codes and specifications

∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟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

∟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

∟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

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	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	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS55	Install and maintain low voltage underground services	40
	Electrotechnology Electrician	
	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	

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Transmission Overhead Pathway Group

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟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

∟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

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∟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

Electrotechnology Electrician 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

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UETTDRIS57	Conduct visual checking and treatment of power system poles and structures	30
	Electrotechnology Systems Electrician	
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟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	
	∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus	
	Distribution Overhead Pathway Group	
	∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus	
	∟UETTDRDP12 Maintain overhead energised low	

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voltage conductors and cables

∟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

∟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

∟UETTDRDP11 Inspect overhead poles-structures and electrical 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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UETTDRIS60	Install and replace power system energy meters and associated equipment	50
	Electrotechnology Electrician	
	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	
	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	
	Distribution Cable Jointing Pathway Group	
	∟UETTDRCJ21 Lay ESI electrical cables	

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∟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

Electrotechnology Electrician 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

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟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

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UETTDRIS61	Install mobile generation set for synchronised LV Genset	50
	Electrotechnology Electrician	
	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	
	∟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	

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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

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	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
	Electrotechnology Electrician 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	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	
UETTDRSB39	Perform power system substation switching operation to a given schedule	50
	Electrical	
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

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∟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

∟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

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∟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 WHS/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	
UETTDRVC29	Control vegetation whilst performing linework	40
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures	

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and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

Qualification Mapping Information

This qualification replaces and is equivalent to UET30612 Certificate III in ESI - Power Systems - Transmission Overhead

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET30719 Certificate III in ESI - Power Systems - Rail Traction

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electrical supply industry (ESI) as a Rail Traction Powerline Worker.

This qualification covers the installation, maintenance and inspection of overhead poles/structures, conductors, cables and rail traction wiring systems, including associated equipment used on these structures in the rail traction industry. It also includes the maintenance of bonds and the operation of rail traction height access equipment.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

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

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

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

Choose a minimum of 190 **weighting points** elective units from the list below, of which between 0 and 70 **weighting points** can be taken from Group A; and between 120 and 190 **weighting points** from Group B. You may select all your elective from this group.

Up to 70 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, their weighting will be 10 points.

Where imported units are selected, care must be taken to ensure that all prerequisite units specified are complied with.

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Core units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
CPCCLDG3001A	Licence to perform dogging	20
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80

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	∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
UETTDREL11	Apply sustainable energy and environmental procedures	20
UETTDREL12	Operate plant and equipment near live electrical conductors and apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL16 Working safely near live electrical apparatus	40
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS52	Install and maintain poles, structures and associated hardware Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	50
UETTDRIS54	Install and maintain poles, structures and overhead conductors and cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the	60

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	workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRRT21	Install traction overhead wiring systems	50
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRRT22	Maintain traction overhead wiring systems	60

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	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
UETTDRRT27	Install overhead traction components and equipment	50
	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	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRRT28	Maintain overhead traction components and equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures	

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	and overhead conductors and cables ∟UETTDRRT27 Install overhead traction components and equipment	
UETTDRRT99	Test and verify rail traction installations	40
	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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical 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 ∟UETTDRRT27 Install overhead traction components and equipment ∟UETTDRRT28 Maintain overhead traction components and equipment	

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

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CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3001A	Licence to perform rigging basic level	40
	∟CPCCLDG3001A Licence to perform dogging	
CPCCLRG3002A	Licence to perform rigging intermediate level	60
	∟CPCCLRG3001A Licence to perform rigging basic level	
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	20
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding intermediate level	20
	∟CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level	
TLILIC0002	Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)	40
TLILIC0003	Licence to operate a forklift truck	40
TLILIC2015	Licence to drive a medium rigid vehicle	20
TLILIC2016	Licence to drive a heavy rigid vehicle	20
TLILIC0006	Licence to operate a bridge and gantry crane	70
TLILIC0010	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC0013	Licence to operate a slewing mobile crane (up to 60 tonnes)	70
TLILIC0015	Licence to operate a slewing mobile crane (over 100 Tonnes)	70
UEENEEE108A	Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of	

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	utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	40

Group B: General elective units		**Weighting Points**
UETTDRDP11	Inspect overhead poles-structures and electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	50
UETTDRDP12	Maintain overhead energised low voltage conductors and cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	60

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	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRIS41	Install network infrastructure electrical equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	

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∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟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

∟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

∟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

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	high voltage underground polymeric cables	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS42	Maintain network infrastructure electrical equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟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	

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	voltage conductors and cables	
	∟UETTDRIS41 Install 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	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟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	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS43	Perform low voltage field switching operation to a given schedule	50
	Electrical	

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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

∟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

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∟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

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	electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services 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	
UETTDRIS44	Perform HV field switching operation to a given schedule Electrical 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	50

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∟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

∟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

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∟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 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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	∟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	
UETTDRIS57	Conduct visual checking and treatment of power system poles and structures	30
	Electrotechnology Systems Electrician	
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRTP26 Install transmission structures and associated hardware	

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∟UETTDRTP27 Maintain transmission structures and associated hardware

∟UETTDRTP29 Install and maintain transmission overhead conductors and cables

∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus

Distribution Overhead Pathway Group

∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables

∟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

∟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

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	∟UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables	
	∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS61	Install mobile generation set for synchronised LV Genset	50
	Electrotechnology Electrician	
	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	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRTP26 Install transmission structures and associated hardware	

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∟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

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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

Electrotechnology Electrician 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

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟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

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	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
UETTDRRT23	Install rail traction bonds	40
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRRT24	Maintain rail traction bonds	50
	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	

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	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
UETTDRRT25	Install overhead rail traction configurations	50
	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	

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	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
UETTDRRT26	Maintain overhead rail traction configurations	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	

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	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
	∟UETTDRRT25 Install overhead rail traction configurations	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
UETTDRRT29	Operate rail road traction height access equipment	20
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	

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	∟UETTDREL16 Working safely near live electrical 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	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
UETTDRRT30	Perform to a given schedule rail traction switching operations	50
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	

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	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRRT21 Install traction overhead wiring systems	
	∟UETTDRRT22 Maintain traction overhead wiring systems	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
UETTDRSB39	Perform power system substation switching operation to a given schedule	50
	Electrical	
	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	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRTP26 Install transmission structures and associated hardware	

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∟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

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	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 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	
UETTDRTP26	Install transmission structures and associated hardware	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and	

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	Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRTP27	Maintain transmission structures and associated hardware	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRTP26 Install transmission structures and associated hardware	
UETTDRTP29	Install and maintain transmission overhead conductors and cables	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology	

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	equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRTP26 Install transmission structures and associated hardware	
	∟UETTDRTP27 Maintain transmission structures and associated hardware	
UETTDRTP30	Inspect transmission overhead structures and electrical apparatus	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRVC29	Control vegetation whilst performing linework	40
	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.	

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circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

Qualification Mapping Information

This qualification replaces and is equivalent to UET30712 Certificate III in ESI – Power Systems – Rail Traction

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET30819 Certificate III in ESI - Power Systems - Distribution Cable Jointing

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skill and knowledge to work in the electricity supply industry (ESI) as a Cable Jointer.

This qualification covers the laying, installation and maintenance of de-energised low voltage (LV) and high voltage (HV) underground polymeric cables and installation and maintenance of electrical equipment and jointing and maintaining energised LV underground paper insulated and polymeric cables. There are options for skills to be obtained for energised cables and/or LV and HV paper insulated cables.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

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

800 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 70 **weighting points** can be taken from Group A; and between 190 and 260 **weighting points** from Group B. You may select all your elective from this group.

Up to 70 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 UET Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

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Where imported units are selected, care must be taken to ensure that all prerequisite units specified are complied with.

Core units		**Weighting Points**
CPCCLDG3001A	Licence to perform dogging	20
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the	80

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	workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
UETTDRCJ21	Lay ESI electrical cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	20
UETTDRCJ26	Install and maintain de-energised low voltage underground polymeric cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDRCJ21 Lay ESI electrical cables ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	50
UETTDRCJ27	Install and maintain de-energised high voltage underground polymeric cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	50

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	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRCJ99	Test and verify distribution cable jointing installations	40
	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	
	∟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	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure	

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	electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDREL11	Apply sustainable energy and environmental procedures	20
UETTDREL12	Operate plant and equipment near live electrical conductors and apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL16 Working safely near live electrical apparatus	40
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS41	Install network infrastructure electrical equipment 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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near	60

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live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟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

∟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

∟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

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	low voltage underground polymeric cables	
	∟UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS42	Maintain network infrastructure electrical equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟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	

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Distribution Overhead Pathway Group

∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables

∟UETTDRIS41 Install 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

∟UETTDRIS41 Install network infrastructure electrical equipment

∟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

∟UETTDRIS41 Install network infrastructure electrical equipment

∟UETTDRIS55 Install and maintain low voltage underground services

UETTDRIS55	Install and maintain low voltage underground services	40

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Electrotechnology Electrician

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

∟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

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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

Electrotechnology Electrician Pathway Group

∟UEENEEE137A Document and apply measures to

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	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	

Group A: Imported and common elective units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
CPCCLHS3001A	Licence to operate a personnel and materials hoist	10
CPCCLHS3002A	Licence to operate a materials hoist	10
CPCCLRG3001A	Licence to perform rigging basic level	40
	∟CPCCLDG3001A Licence to perform dogging	
CPCCLRG3002A	Licence to perform rigging intermediate level	60
	∟CPCCLRG3001A Licence to perform rigging basic level	
CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level	20
CPCCLSF3001A	Licence to erect, alter and dismantle scaffolding intermediate level	20
	∟CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level	
TLILIC0002	Licence to operate a vehicle loading crane (capacity 10	40

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	metre tonnes and above)	
TLILIC0003	Licence to operate a forklift truck	40
TLILIC2015	Licence to drive a medium rigid vehicle	20
TLILIC2016	Licence to drive a heavy rigid vehicle	20
TLILIC0006	Licence to operate a bridge and gantry crane	70
TLILIC0010	Licence to operate a slewing mobile crane (up to 20 tonnes)	70
TLILIC0013	Licence to operate a slewing mobile crane (up to 60 tonnes)	70
TLILIC0015	Licence to operate a slewing mobile crane (over 100 Tonnes)	70
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	40

Group B: General elective units		**Weighting Points**
UETTDRCJ22	Install and maintain de-energised low voltage underground paper insulated cables 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	40

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	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 ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ23	Install and maintain de-energised high voltage underground paper insulated cables 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	60

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	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟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	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ24	Joint and maintain energised low voltage underground paper insulated cables	60
	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	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables	

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	∟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	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ25	Perform straight through high voltage paper insulated to polymeric transition joint	50
	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	
	∟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	

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	live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ28	Joint and maintain energised low voltage underground polymeric cables 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 ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment	50

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	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRDP11	Inspect overhead poles-structures and electrical apparatus	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS43	Perform low voltage field switching operation to a given schedule	50
	Electrical	
	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	

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environmental procedures

∟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

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∟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

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

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	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRIS44	Perform HV field switching operation to a given schedule	50
	Electrical	
	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	
	∟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	

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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

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	∟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 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	
UETTDRIS53	Install and maintain power system public lighting	40
	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	

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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

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟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

∟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

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures

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	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	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS56	Install and maintain low voltage overhead services	40
	Electrotechnology Electrician	
	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.	

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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

∟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

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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

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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

Electrotechnology Electrician 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

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	sustainable procedures in the energy sector	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRIS57	Conduct visual checking and treatment of power system poles and structures	30
	Electrotechnology Systems Electrician	
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	Transmission Overhead Pathway Group	
	∟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	
	∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus	

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Distribution Overhead Pathway Group

∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables

∟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

∟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

∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

∟UETTDRIS41 Install network infrastructure electrical equipment

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	∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS58	Locate faults in power system underground power cables 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 ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	60

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UETTDRIS59	Conduct high potential testing of power system underground power cables 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 ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	50
UETTDRIS60	Install and replace power system energy meters and associated equipment Electrotechnology Electrician Common Unit Group	50

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∟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

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

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

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	∟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	
	Electrotechnology Electrician 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	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	
UETTDRIS61	Install mobile generation set for synchronised LV Genset	50
	Electrotechnology Electrician	
	Common Unit Group	

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∟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

∟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

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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

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	∟UETTDRIS55 Install and maintain low voltage underground services	
	Electrotechnology Electrician 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	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	
UETTDRSB39	Perform power system substation switching operation to a given schedule	50
	Electrical	
	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	

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∟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

∟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

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∟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 electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

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∟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

Qualification Mapping Information

This qualification replaces and is equivalent to UET30812 Certificate III in ESI - Power Systems - Distribution Cable Jointing

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET30919 Certificate III in ESI - Remote Community Utilities Worker

Modification History

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

Qualification Description

This qualification provides the skill and knowledge to work in the electricity supply industry (ESI) as a Remote Community Utilities Worker.

This qualification covers inspecting and maintaining essential public utilities (excluding mine sites) within very remote communities. All work on essential electrical utilities will be undertaken in non-energised (dead) environments other than for testing purposes. The use of support plant and equipment to perform these tasks and environmental requirements also play a part in this job function.

Very Remote Communities: Means a community with restricted access and very little accessibility of goods, services and opportunities for social interaction. Supporting information on the classification of a very remote community can be defined using the latest version of Accessibility/Remoteness Index of Australia (ARIA).

Non-energised (dead): Means prior to the commencement of work, all electrical apparatus is to be isolated. That is for high voltage (HV) (short-circuited and earthed) and for low voltage (LV) (short-circuited to the neutral).

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

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

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and 180 **weighting points** can be taken from Group A; and between 180 and 360 **weighting points** from Group B. You may select all your elective from this group.

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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure that all prerequisite units specified are complied with.

Core units		**Weighting Points**
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE103A	Solve problems in ELV single path circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20

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UEENEEK101A	Maintain safety and tidiness of remote area power supply systems	20
	∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	
	∟UEENEEK102A Work safely with remote area power supply systems	
UEENEEK102A	Work safely with remote area power supply systems	20
	∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	
UEENEEK116A	Maintain and repair remote area power generation facilities	80
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEK101A Maintain safety and tidiness of remote area power supply systems	
	∟UEENEEK102A Work safely with remote area power supply systems	
	∟UEENEEK104A Conduct periodic maintenance of remote area power supply generator sets	
	Electrotechnology Pathway Group	
	∟UEENEEE104A Solve problems in d.c. circuits	
	Remote Area Pathway Group	
	∟UEENEEE131A Solve problems in ELV circuits for non electrical workers	
UEENEEK120A	Maintain operation of remote area power generation plant	120
	∟UEENEEK116A Maintain and repair remote area power generation facilities	
UETTDREL11	Apply sustainable energy and environmental procedures	20

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UETTDREL12	Operate plant and equipment near live electrical conductors and apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL16 Working safely near live electrical apparatus	40
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS32	Solve electrical problems in remote community network apparatus Common Unit Group ∟UEENEEE103A Solve problems in ELV single path circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UETTDRIS33	Solve electrical problems in remote community network systems Common Unit Group ∟UEENEEE103A Solve problems in ELV single path circuits ∟UETTDRIS32 Solve electrical problems in remote community network apparatus ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UETTDRIS99	Test and verify distribution remote area installations Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE103A Solve problems in ELV single path	40

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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

∟UEENEEK101A Maintain safety and tidiness of remote area power supply systems

∟UEENEEK102A Work safely with remote area power supply systems

∟UEENEEK116A Maintain and repair remote area power generation facilities

∟UEENEEK120A Maintain operation of remote area power generation plant

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS32 Solve electrical problems in remote community network apparatus

∟UETTDRIS33 Solve electrical problems in remote community network systems

Group A: Imported and common elective units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
CPCCLDG3001A	Licence to perform dogging	20
NWPGEN007	Sample and test drinking water	20
NWPTRT001	Operate and control water treatment processes	30
TLILIC0002	Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)	40
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE131A	Solve problems in ELV circuits for non electrical	40

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	workers ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UEENEEK103A	Conduct periodic maintenance of remote area power supply battery banks ∟ UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, dismantle, assemble of utilities industry components ∟ UEENEEK101A Maintain safety and tidiness of remote area power supply systems ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEK102A Work safely with remote area power supply systems ∟ UEENEEE131A Solve problems in ELV circuits for non electrical workers OR ∟ UEENEEE104A Solve problems in d.c. circuits	40
UEENEEK104A	Conduct periodic maintenance of remote area power supply generator sets ∟ UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, dismantle, assemble of utilities industry components ∟ UEENEEK101A Maintain safety and tidiness of remote area power supply systems ∟ UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟ UEENEEK102A Work safely with remote area power supply systems ∟ UEENEEE131A Solve problems in ELV circuits for non electrical workers OR ∟ UEENEEE104A Solve problems in d.c. circuits	40
UEENEEK105A	Conduct periodic maintenance of remote area power supply photo voltaic arrays	40

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	∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	
	∟UEENEEK101A Maintain safety and tidiness of remote area power supply systems	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEK102A Work safely with remote area power supply systems	
	∟UEENEEE131A Solve problems in ELV circuits for non electrical workers	
	OR	
	∟UEENEEE104A Solve problems in d.c. circuits	
UEENEEK106A	Conduct periodic maintenance of remote area power supply wind generators	40
	∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	
	∟UEENEEK101A Maintain safety and tidiness of remote area power supply systems	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEK102A Work safely with remote area power supply systems	
	∟UEENEEE131A Solve problems in ELV circuits for non electrical workers	
	OR	
	∟UEENEEE104A Solve problems in d.c. circuits	
UEENEEP024A	Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UEENEEP026A	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies	20
	∟UEENEEE101A Apply Occupational Health and	

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	Safety regulations, codes and practices in the workplace	

Group B: General elective units		**Weighting Points**
UETTDRCJ21	Lay ESI electrical cables	20
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRCJ26	Install and maintain de-energised low voltage underground polymeric cables	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRCJ27	Install and maintain de-energised high voltage underground polymeric cables	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRDP11	Inspect overhead poles-structures and electrical apparatus	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS34	Install and replace energy meters and associated equipment in remote communities	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟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	
	∟UEENEEK101A Maintain safety and tidiness of	

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	remote area power supply systems ∟UEENEEK102A Work safely with remote area power supply systems ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
UETTDRIS35	Perform remote community network field switching to a given schedule Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟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 ∟UEENEEK101A Maintain safety and tidiness of remote area power supply systems ∟UEENEEK102A Work safely with remote area power supply systems ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	40
UETTDRIS36	Install and maintain low voltage services in remote communities (overhead) Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE103A Solve problems in ELV single path circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams,	40

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	schedules, standards, codes and specifications ∟ UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work ∟ UEENEEK101A Maintain safety and tidiness of remote area power supply systems ∟ UEENEEK102A Work safely with remote area power supply systems ∟ UEENEEK116A Maintain and repair remote area power generation facilities ∟ UEENEEK120A Maintain operation of remote area power generation plant ∟ UETTDREL11 Apply sustainable energy and environmental procedures ∟ UETTDREL16 Working safely near live electrical apparatus ∟ UETTDRIS32 Solve electrical problems in remote community network apparatus ∟ UETTDRIS33 Solve electrical problems in remote community network systems ∟ UETTDRIS99 Test and verify distribution remote area installations	
UETTDRIS37	Install and maintain low voltage services in remote communities (underground) Common Unit Group ∟ UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟ UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟ UEENEEE103A Solve problems in ELV single path 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	40

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	∟UEENEEK101A Maintain safety and tidiness of remote area power supply systems	
	∟UEENEEK102A Work safely with remote area power supply systems	
	∟UEENEEK116A Maintain and repair remote area power generation facilities	
	∟UEENEEK120A Maintain operation of remote area power generation plant	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS32 Solve electrical problems in remote community network apparatus	
	∟UETTDRIS33 Solve electrical problems in remote community network systems	
	∟UETTDRIS99 Test and verify distribution remote area installations	
UETTDRIS38	Install and maintain public lighting systems in remote communities	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE103A Solve problems in ELV single path 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	
	∟UEENEEK101A Maintain safety and tidiness of remote area power supply systems	
	∟UEENEEK102A Work safely with remote area power supply systems	

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	∟UEENEEK116A Maintain and repair remote area power generation facilities	
	∟UEENEEK120A Maintain operation of remote area power generation plant	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS32 Solve electrical problems in remote community network apparatus	
	∟UETTDRIS33 Solve electrical problems in remote community network systems	
	∟UETTDRIS99 Test and verify distribution remote area installations	
UETTDRIS52	Install and maintain poles, structures and associated hardware	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS54	Install and maintain poles, structures and overhead conductors and cables	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology	

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	equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS55	Install and maintain low voltage underground services	40
	Electrotechnology Electrician	
	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	
	∟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	

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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

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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

Electrotechnology Electrician 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

Qualification Mapping Information

This qualification replaces and is equivalent to UET30912 Certificate III in ESI - Remote Community Utilities Worker

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET40419 Certificate IV in ESI - Network Systems

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work on network systems in the electricity supply industry (ESI).

This qualification covers work on the network systems in the specific fields of live line transmission, live line distribution, live line rail traction and/or installation and maintenance of specialised underground cables. These roles may lead or supervise work teams and work in transmission, distribution, rail or cable jointing.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

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

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

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

Choose a total of 740 **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 420 **weighting points** can be taken from Group B; and between 320 and 740 **weighting points** taken from Group C. You may select all your electives from this group.

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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

Where imported units are selected, care must be taken to ensure all prerequisite units specified

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are complied with.

Core units		**Weighting Points**
CPCCLDG3001A	Licence to perform dogging	20
TLILIC0005	Licence to operate a boom-type elevating work platform (boom length 11 metres or more)	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UETTDREL11	Apply sustainable energy and environmental procedures	20

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UETTDREL12	Operate plant and equipment near live electrical conductors and apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL16 Working safely near live electrical apparatus	40
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS62	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL16 Working safely near live electrical apparatus	30
UETTDRIS63	Implement & monitor power system environmental & sustainable energy management policies & procedures Electrotechnology Pathway Unit Group ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ESI - TDR Pathway Unit Group ∟UETTDREL11 Apply sustainable energy and environmental procedures	30

Group A: Imported and common elective units		**Weighting Points**
AHCMOM213	Operate and maintain chainsaws	20
BSBINM401	Implement workplace information system	40
BSBLDR402	Lead effective workplace relationships	50
BSBLDR403	Lead team effectiveness	50
BSBMGT402	Implement operational plan	40

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BSBMGT403	Implement continuous improvement	40
CPCCLRG3001A	Licence to perform rigging basic level	40
	∟CPCCLDG3001A Licence to perform dogging	

Group B: Qualification elective units		**Weighting Points**
UETTDRCJ21	Lay ESI electrical cables	20
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRCJ22	Install and maintain de-energised low voltage underground paper insulated cables	40
	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	
	∟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	

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	environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ23	Install and maintain de-energised high voltage underground paper insulated cables	60
	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	
	∟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	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical	

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	equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ24	Joint and maintain energised low voltage underground paper insulated cables	60
	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	
	∟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	
	∟UETTDREL16 Working safely near live electrical 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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UETTDRCJ25	Perform straight through high voltage paper insulated to polymeric transition joint 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 ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	50
UETTDRCJ26	Install and maintain de-energised low voltage underground polymeric cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	50

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	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRCJ27	Install and maintain de-energised high voltage underground polymeric cables	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRCJ28	Joint and maintain energised low voltage underground polymeric cables	50
	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,	

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	standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟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	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ99	Test and verify distribution cable jointing installations	40
	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	
	∟UETTDRCJ21 Lay ESI electrical cables	

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	∟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	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRDP11	Inspect overhead poles-structures and electrical apparatus	50
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRDP12	Maintain overhead energised low voltage conductors and cables	60
	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,	

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	standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRDP99	Test and verify distribution overhead installations	40
	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	
	∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus	
	∟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	
	∟UETTDREL16 Working safely near live electrical	

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	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	
UETTDRIS41	Install network infrastructure electrical equipment 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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical apparatus Transmission Overhead Pathway Group ∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables ∟UETTDRTP26 Install transmission structures and associated hardware ∟UETTDRTP27 Maintain transmission structures and	60

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	associated hardware	
	∟UETTDRTP29 Install and maintain transmission overhead conductors and cables	
	Distribution Overhead Pathway Group	
	∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables	
	∟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	
	∟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	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS42	Maintain network infrastructure electrical equipment	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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∟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

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

Transmission Overhead Pathway Group

∟UETTDRIS41 Install network infrastructure electrical equipment

∟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

∟UETTDRIS41 Install 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

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	Rail Traction Pathway Group	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟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	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS44	Perform HV field switching operation to a given schedule	50
	Electrical	
	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,	

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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

∟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

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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 electrotechnology work

∟UEENEEG006A Solve problems in single and three phase low voltage machines

∟UEENEEG033A Solve problems in single and three

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	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	
UETTDRIS52	Install and maintain poles, structures and associated hardware Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	50
UETTDRIS54	Install and maintain poles, structures and overhead conductors and cables Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules,	60

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	standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS55	Install and maintain low voltage underground services	40
	Electrotechnology Electrician	
	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	
	∟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	

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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

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	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	Electrotechnology Electrician 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	
UETTDRIS56	Install and maintain low voltage overhead services	40
	Electrotechnology Electrician	
	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.	

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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

∟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

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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

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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

Electrotechnology Electrician 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

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	sustainable procedures in the energy sector ∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRIS57	Conduct visual checking and treatment of power system poles and structures Electrotechnology Systems Electrician 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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical apparatus Transmission Overhead Pathway Group ∟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 ∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus Distribution Overhead Pathway Group	30

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∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

∟UETTDRDP12 Maintain overhead energised low voltage conductors and cables

∟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

∟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

∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

∟UETTDRIS41 Install network infrastructure electrical equipment

∟UETTDRIS42 Maintain network infrastructure

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	electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS58	Locate faults in power system underground power cables 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 ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	60
UETTDRIS59	Conduct high potential testing of power system underground power cables	50

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	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 ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRIS60	Install and replace power system energy meters and associated equipment Electrotechnology Electrician Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle	50

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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

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

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

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	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
	Electrotechnology Electrician 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	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	
UETTDRIS61	Install mobile generation set for synchronised LV Genset	50
	Electrotechnology Electrician	
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

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∟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

∟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

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∟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

Electrotechnology Electrician Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology

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	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 ∟UEENEEG103A Install low voltage wiring and accessories ∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations ∟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	
UETTDRRT21	Install traction overhead wiring systems	50
	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 ∟UETTDREL11 Apply sustainable energy and environmental procedures	

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	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRRT22	Maintain traction overhead wiring systems	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
UETTDRRT23	Install rail traction bonds	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and	

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	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
UETTDRRT24	Maintain rail traction bonds	50
	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	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
UETTDRRT25	Install overhead rail traction configurations	50
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical	

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	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	
UETTDRRT26	Maintain overhead rail traction configurations 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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS52 Install and maintain poles, structures and associated hardware ∟UETTDRIS54 Install and maintain poles, structures	60

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	and overhead conductors and cables	
	∟UETTDRRT21 Install traction overhead wiring systems	
	∟UETTDRRT22 Maintain traction overhead wiring systems	
	∟UETTDRRT23 Install rail traction bonds	
	∟UETTDRRT25 Install overhead rail traction configurations	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
UETTDRRT27	Install overhead traction components and equipment	50
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	

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UETTDRRT28	Maintain overhead traction components and equipment	60
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRRT27 Install overhead traction components and equipment	
UETTDRRT29	Operate rail road traction height access equipment	20
	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	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
UETTDRRT30	Perform to a given schedule rail traction switching operations	50
	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	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
UETTDRRT99	Test and verify rail traction installations	40
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures	

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	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 ∟UETTDRRT27 Install overhead traction components and equipment ∟UETTDRRT28 Maintain overhead traction components and equipment	
UETTDRSB39	Perform power system substation switching operation to a given schedule Electrical 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 ∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables ∟UETTDRTP26 Install transmission structures and	50

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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

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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 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

UETTDRTP26	Install transmission structures and associated hardware	60

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	Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRTP27	Maintain transmission structures and associated hardware	60
	Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRTP26 Install transmission structures and associated hardware	
UETTDRTP29	Install and maintain transmission overhead conductors and cables	60
	Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology	

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	equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRTP26 Install transmission structures and associated hardware ∟UETTDRTP27 Maintain transmission structures and associated hardware	
UETTDRTP30	Inspect transmission overhead structures and electrical apparatus Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus	40
UETTDRTP99	Test and verify transmission overhead installations 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 ∟UETTDREL11 Apply sustainable energy and	40

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	environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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	
	∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus	
UETTDRVC29	Control vegetation whilst performing linework	40
	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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures	

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and overhead conductors and cables

Group C: Qualification elective units		**Weighting Points**
UETTDRCJ29	Install gas and oil filled specialised underground cables 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 ∟UETTDRCJ21 Lay ESI electrical cables ∟UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables ∟UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables ∟UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables ∟UETTDRCJ99 Test and verify distribution cable jointing installations ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS41 Install network infrastructure electrical equipment ∟UETTDRIS42 Maintain network infrastructure electrical equipment ∟UETTDRIS55 Install and maintain low voltage	60

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	underground services	
UETTDRCJ30	Maintain gas and oil filled specialised underground cables	60
	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	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables	
	∟UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables	
	∟UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables	
	∟UETTDRCJ29 Install gas and oil filled specialised underground cables	
	∟UETTDRCJ99 Test and verify distribution cable jointing installations	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	

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	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRCJ31	Install and maintain polymeric specialised underground cables	65
	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	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables	
	∟UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables	
	∟UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables	
	∟UETTDRCJ99 Test and verify distribution cable jointing installations	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical 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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UETTDRCJ32	Install and maintain gas and oil pressure systems for specialised underground cables	65
	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	
	∟UETTDRCJ21 Lay ESI electrical cables	
	∟UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables	
	∟UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables	
	∟UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables	
	∟UETTDRCJ99 Test and verify distribution cable jointing installations	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS41 Install network infrastructure electrical equipment	
	∟UETTDRIS42 Maintain network infrastructure electrical equipment	
	∟UETTDRIS55 Install and maintain low voltage underground services	
UETTDRDP13	Maintain energised HV distribution overhead electrical	70

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	apparatus (stick) Pathway 1 Qualified and Authorised Distribution Line Worker Pathway 2 ∟BSBLDR403 Lead team effectiveness ∟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 ∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟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 ∟UETTDRIS65 Contribute to coordinated HV live working	
UETTDRDP14	Maintain energised HV distribution overhead electrical apparatus (glove)	70

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	Pathway 1 Qualified and Authorised Distribution Line Worker Pathway 2 ∟BSBLDR403 Lead team effectiveness ∟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 ∟UETTDRDP11 Inspect overhead poles-structures and electrical apparatus ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟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 ∟UETTDRIS65 Contribute to coordinated HV live working	
UETTDRDS31	Draft and layout a power system overhead distribution extension Common Unit Group	60

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	∟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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS32	Draft and layout a power system underground distribution extension	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	

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	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS33	Draft and layout a power system street lighting system	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS34	Draft and layout a power system distribution substation minor upgrade	60
	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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRIS48	Develop high voltage switching schedule	60
	Electrical	
	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	
	∟UETTDRIS44 Perform HV field switching operation to a given schedule	
	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

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∟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 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

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	network equipment	
UETTDRIS49	Develop low voltage switching schedule	90
	Electrical	
	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	
	∟UETTDRIS43 Perform low voltage field switching operation to a given schedule	
	Transmission Overhead Pathway Group	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟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	

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∟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

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	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 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	
UETTDRIS50	Coordinate power system permit procedures Electrical 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	60

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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

∟UETTDRIS44 Perform HV field switching operation to a given schedule

∟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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

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∟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

∟UETTDRRT30 Perform to a given schedule rail traction switching operations

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

∟UETTDRIS43 Perform low voltage field switching

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	operation to a given schedule	
	∟UETTDRIS55 Install and maintain low voltage underground services	
	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	
	∟UETTDRSB39 Perform power system substation switching operation to a given schedule	
UETTDRIS51	Coordinate and direct power system switching schedules	60
	Electrical	
	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	

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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

∟UETTDRIS44 Perform HV field switching operation to a given schedule

∟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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟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

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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

∟UETTDRRT30 Perform to a given schedule rail traction switching operations

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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟UETTDRIS55 Install and maintain low voltage underground services

Electrical Pathway Group

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	∟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	
	∟UETTDRSB39 Perform power system substation switching operation to a given schedule	
UETTDRIS64	Install mobile generation set for synchronised HV Genset	40
	Electrical	
	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	

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apparatus

Transmission Overhead Pathway Group

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDRIS44 Perform HV field switching operation to a given schedule

∟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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟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

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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

∟UETTDRRT30 Perform to a given schedule rail traction switching operations

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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟UETTDRIS55 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

∟UEENEEG006A Solve problems in single and three

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	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	
	∟UETTDRSB39 Perform power system substation switching operation to a given schedule	
UETTDRIS65	Contribute to coordinated HV live working	50
UETTDRRT31	Maintain energised d.c. traction overhead wiring system	60
	Pathway 1	
	Qualified and Authorised Rail Traction Line Worker	
	Pathway 2	
	∟BSBLDR403 Lead team effectiveness	
	∟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	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS52 Install and maintain poles, structures and associated hardware	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRIS65 Contribute to coordinated HV live working	
	∟UETTDRRT21 Install traction overhead wiring systems	
	∟UETTDRRT22 Maintain traction overhead wiring systems	
	∟UETTDRRT23 Install rail traction bonds	
	∟UETTDRRT25 Install overhead rail traction configurations	
	∟UETTDRRT26 Maintain overhead rail traction configurations	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
	∟UETTDRRT29 Operate rail road traction height access equipment	
	∟UETTDRRT99 Test and verify rail traction installations	
UETTDRRT32	Maintain energised traction overhead electrical apparatus using stick techniques	70
	Pathway 1	
	Qualified and Authorised Rail Traction Line Worker	
	Pathway 2	
	∟BSBLDR403 Lead team effectiveness	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

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∟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

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

∟UETTDRIS65 Contribute to coordinated HV live working

∟UETTDRRT21 Install traction overhead wiring systems

∟UETTDRRT22 Maintain traction overhead wiring systems

∟UETTDRRT23 Install rail traction bonds

∟UETTDRRT25 Install overhead rail traction configurations

∟UETTDRRT26 Maintain overhead rail traction configurations

∟UETTDRRT27 Install overhead traction components and equipment

∟UETTDRRT28 Maintain overhead traction components and equipment

∟UETTDRRT29 Operate rail road traction height access equipment

∟UETTDRRT31 Maintain energised d.c. traction overhead wiring system

∟UETTDRRT99 Test and verify rail traction

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	installations	
UETTDRRT33	Maintain energised traction overhead electrical apparatus using glove techniques Pathway 1 Qualified and Authorised Rail Traction Lineworker Pathway 2 ∟BSBLDR403 Lead team effectiveness ∟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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS52 Install and maintain poles, structures and associated hardware ∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables ∟UETTDRIS65 Contribute to coordinated HV live working ∟UETTDRRT21 Install traction overhead wiring systems ∟UETTDRRT22 Maintain traction overhead wiring systems ∟UETTDRRT23 Install rail traction bonds	70

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	∟UETTDRRT25 Install overhead rail traction configurations	
	∟UETTDRRT26 Maintain overhead rail traction configurations	
	∟UETTDRRT27 Install overhead traction components and equipment	
	∟UETTDRRT28 Maintain overhead traction components and equipment	
	∟UETTDRRT29 Operate rail road traction height access equipment	
	∟UETTDRRT31 Maintain energised d.c. traction overhead wiring system	
	∟UETTDRRT99 Test and verify rail traction installations	
UETTDRTP31	Maintain energised transmission lines using high voltage live work stick method	70
	Pathway 1	
	Certificate III Transmission Overhead Powerline Worker or a qualified Transmission Powerline Worker.	
	Pathway 2	
	∟BSBLDR403 Lead team effectiveness	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical	

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	apparatus ∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables ∟UETTDRIS65 Contribute to coordinated HV live working ∟UETTDRTP26 Install transmission structures and associated hardware ∟UETTDRTP27 Maintain transmission structures and associated hardware ∟UETTDRTP29 Install and maintain transmission overhead conductors and cables ∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus ∟UETTDRTP99 Test and verify transmission overhead installations	
UETTDRTP32	Maintain energised transmission lines using high voltage live work bare hand method Pathway 1 Qualified and Authorised Transmission Line Worker Pathway 2 ∟BSBLDR403 Lead team effectiveness ∟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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	70

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	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRIS65 Contribute to coordinated HV live working	
	∟UETTDRTP26 Install transmission structures and associated hardware	
	∟UETTDRTP27 Maintain transmission structures and associated hardware	
	∟UETTDRTP29 Install and maintain transmission overhead conductors and cables	
	∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus	
	∟UETTDRTP31 Maintain energised transmission lines using high voltage live work stick method	
	∟UETTDRTP99 Test and verify transmission overhead installations	
UETTDRTP33	Maintain energised transmission lines using bare hand technique on a helicopter platform	60
	Pathway 1	
	Qualified and Authorised Transmission Line Worker	
	Pathway 2	
	∟BSBLDR403 Lead team effectiveness	
	∟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	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables	
	∟UETTDRIS65 Contribute to coordinated HV live working	
	∟UETTDRTP26 Install transmission structures and associated hardware	
	∟UETTDRTP27 Maintain transmission structures and associated hardware	
	∟UETTDRTP29 Install and maintain transmission overhead conductors and cables	
	∟UETTDRTP30 Inspect transmission overhead structures and electrical apparatus	
	∟UETTDRTP31 Maintain energised transmission lines using high voltage live work stick method	
	∟UETTDRTP32 Maintain energised transmission lines using high voltage live work bare hand method	
	∟UETTDRTP99 Test and verify transmission overhead installations	
UETTDRVC30	Coordinate vegetation control operations	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

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Qualification Mapping Information

This qualification replaces and is equivalent to UET40412 Certificate IV in ESI - Network Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET40519 Certificate IV in ESI - Power Systems Substations

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in power system substations in the electricity supply industry (ESI).

This qualification covers selecting, installing, setting up, testing, fault finding, repairing and maintaining electrical systems and equipment in buildings and premises. It also provides a career in installation and maintenance of substations, such as the maintenance of high voltage (HV) power system, including circuit breakers and transformers. It includes substation switching, inspection and diagnosing and rectifying faults. Options are available for skills to be obtained in high current direct current (d.c.) switchgear and equipment, installation of HV plant and equipment and/or the maintenance and commissioning of discrete protection and control systems.

It includes the Electrical Regulatory Authorities Council (ERAC) requirements for an 'Electrician's licence'. Competency development activities in this qualification are subject to regulations directly related to licencing.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

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

1030 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 50 **weighting points** can be taken from Group A; between 0 and 120 **weighting points** can be taken from Group B; and between 130 and 250 **weighting points** taken from Group C. You may select all your electives from this group.

Up to 50 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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

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

Core units		**Weighting Points**
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEG006A	Solve problems in single and three phase low voltage machines ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology	80

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	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. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG063A	Arrange circuits, control and protection for general electrical installations	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnolgy equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic	

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	devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG103A	Install low voltage wiring and accessories ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c.	20

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	circuit	
	∟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	
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟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	

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	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	

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	∟UEENEEG109A Develop and connect electrical control circuits Conditions: 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' applying for an 'electrical contractors licence' 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 permanent employment as a licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three	60

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	phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟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	40
UEENEEG109A	Develop and connect electrical control circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits	80

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	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS62	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS63	Implement & monitor power system environmental & sustainable energy management policies & procedures	30
	Electrotechnology Pathway Unit Group	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	ESI - TDR Pathway Unit Group	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
UETTDRSB22	Carry out power systems substation inspection	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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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

∟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

∟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

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

∟UEENEEG199A Conduct compliance and functional

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	verification of electrical apparatus and existing circuits	
UETTDRSB23	Install and maintain substation direct current systems	30
	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	
	∟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	

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Group A: Imported and common elective units		**Weighting Points**
BSBINM401	Implement workplace information system	40
BSBLDR402	Lead effective workplace relationships	50
BSBLDR403	Lead team effectiveness	50
BSBMGT402	Implement operational plan	40
BSBMGT403	Implement continuous improvement	40

Group B: Qualification elective units		**Weighting Points**
UETTDRIS47	Sample, test, filter and reinstate insulating oil	40
	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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UETTDRIS67	Solve problems in energy supply network equipment 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	80
UETTDRIS68	Solve problems in energy supply network protection equipment and systems 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	40

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	accessories for low voltage circuits ∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRSB29	Maintain capacitor bank equipment for voltage regulation 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	40
UETTDRSB33	Install high voltage plant and equipment 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,	50

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	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	
	∟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	
UETTDRSB39	Perform power system substation switching operation to a given schedule	50
	Electrical	
	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	

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∟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

∟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

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∟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 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

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	∟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	
Group C: Qualification elective units		**Weighting Points**
UETTDRSB21	Diagnose and rectify faults in substation environment	40
	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	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and	

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	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	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB24	Maintain high voltage power system circuit breakers	60
	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	

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	protection for general electrical installations	
	∟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	
	∟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	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB25	Maintain high voltage power and instrument transformers	80
	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	

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	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	
	∟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	
	∟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	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB26	Install high current d.c. equipment and switchgear	40
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

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	∟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	
	∟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	
UETTDRSB27	Maintain high current d.c. equipment and switchgear	40
	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	

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	∟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	
	∟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	
	∟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	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB30	Maintain high voltage power system static VAR compensators (SVC)	30
	Common Unit Group	

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∟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

∟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

∟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

∟UETTDRSB25 Maintain high voltage power and instrument transformers

∟UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical

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	installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB31	Maintain high voltage power system synchronous condensers	50
	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	
	∟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	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	

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	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB32	Maintain power transformer on load tap changers (OLTC)	80
	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	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c.	

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	circuits	
	∟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	
	∟UETTDRSB25 Maintain high voltage power and instrument transformers	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB34	Carry out surveys using thermovision techniques	30
	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	

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	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	
	∟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	
	∟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	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB35	Maintain discrete control and protection systems	80
	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	

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	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	
	∟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	
	∟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	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB36	Commission discrete control and protection systems	30
	Common Unit Group	

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∟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

∟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

∟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

∟UETTDRSB25 Maintain high voltage power and instrument transformers

∟UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical

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	installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB37	Maintain power system distribution field devices	80
	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	
	∟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	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
	∟UEENEEK142A Apply environmentally and	

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	sustainable procedures in the energy sector	
	Pathway 1 - Electrician	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations	
	Pathway 2 - Electrical Fitter	
	∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits	
UETTDRSB38	Commission power system distribution field devices	30
	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	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG106A Terminate cables, cords and	

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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

∟UETTDRSB37 Maintain power system distribution field devices

Pathway 1 - Electrician

∟UEENEEG103A Install low voltage wiring and accessories

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

∟UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

Qualification Mapping Information

This qualification replaces and is equivalent to UET40512 Certificate IV in ESI - Power Systems Substations

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET40619 Certificate IV in ESI - Power Systems Network Infrastructure

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work on power system network infrastructure in the electricity supply industry (ESI).

This qualification covers the selection, installation, set up, testing, fault finding, repair and maintenance of electrical systems and equipment in buildings and premises. It includes skills and knowledge needed for a career in installation and maintenance of network infrastructure in the transmission, distribution or rail traction in the electricity supply industry.

It includes Electrical Regulatory Authorities Council (ERAC) requirements for an Electrician's licence. Competency development activities in this qualification are subject to regulations directly related to licencing.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

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

940 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 50 **weighting points** can be taken from Group A; between 0 and 140 **weighting points** can be taken from Group B; and between 200 and 340 **weighting points** taken from Group C. You may select all your electives from this group.

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 selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

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

		Weighting Points
Core units		
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE105A	Fix and secure electrotechnology equipment ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE137A	Document and apply measures to control OHS risks associated with electrotechnology work ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEG006A	Solve problems in single and three phase low voltage machines ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology	80

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	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. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG033A	Solve problems in single and three phase low voltage electrical apparatus and circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	60
UEENEEG063A	Arrange circuits, control and protection for general electrical installations ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnolgy equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG101A Solve problems in electromagnetic	40

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	devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG103A	Install low voltage wiring and accessories ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c.	20

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	circuit	
	∟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	
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟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	

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	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG103A Install low voltage wiring and accessories	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	

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	∟UEENEEG109A Develop and connect electrical control circuits Conditions: 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' applying for an 'electrical contractors licence' 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 permanent employment as a licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.	
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	40
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three	60

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	phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE105A Fix and secure electrotechnology equipment ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEG006A Solve problems in single and three phase low voltage machines ∟UEENEEG033A Solve problems in single and three phase electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟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	40
UEENEEG109A	Develop and connect electrical control circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components ∟UEENEEE104A Solve problems in d.c. circuits	80

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	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG006A Solve problems in single and three phase low voltage machines	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEK142A	Apply environmentally and sustainable procedures in the energy sector	20
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS62	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS63	Implement & monitor power system environmental & sustainable energy management policies & procedures	30
	Electrotechnology Pathway Unit Group	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	ESI - TDR Pathway Unit Group	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	

Group A: Imported and common elective units		**Weighting Points**
BSBINM401	Implement workplace information system	40
BSBLDR402	Lead effective workplace relationships	50

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BSBLDR403	Lead team effectiveness	50
BSBMGT402	Implement operational plan	40
BSBMGT403	Implement continuous improvement	40

Group B: Qualification elective units		**Weighting Points**
UEENEEG171A	Install, set up and commission interval metering	20
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits	
	∟UEENEEG063A Arrange circuits, control and protection for general electrical installations	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟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	

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	control circuits	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
UETTDRIS43	Perform low voltage field switching operation to a given schedule	50
	Electrical	
	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	
	∟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	

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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

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	∟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	
	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	
UETTDRIS44	Perform HV field switching operation to a given schedule	50
	Electrical	
	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	

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∟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

∟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

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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 electrotechnology work

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	∟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	
UETTDRIS47	Sample, test, filter and reinstate insulating oil	40
	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	

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	sustainable procedures in the energy sector	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS67	Solve problems in energy supply network equipment	80
	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	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems	40
	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	

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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	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRSB39	Perform power system substation switching operation to a given schedule	50
	Electrical	
	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	
	∟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	

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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

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∟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 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

Group C: Qualification elective units		**Weighting Points**
UEENEEG076A	Install and replace low voltage current transformer metering Note: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the prerequisite requirements of this unit. ∟UEENEEE101A Apply Occupational Health and	20

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	Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits ∟UEENEEG063A Arrange circuits, control and protection for general electrical installations ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuit ∟UEENEEG103A Install low voltage wiring and accessories ∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations ∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations ∟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	
UETTDRCJ33	Install and maintain network infrastructure LV underground cables	40

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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

∟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

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟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

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	sustainable procedures in the energy sector ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS46 Install and maintain ESI network infrastructure electrical equipment ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRCJ34	Install and maintain network infrastructure HV underground cables 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 ∟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 ∟UEENEEG104A Install appliances, switchgear and	50

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	associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟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	
	∟UETTDRCJ33 Install and maintain network infrastructure LV underground cables	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS46 Install and maintain ESI network infrastructure electrical equipment	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDP15	Inspect, maintain and restore energised low voltage overhead distribution network infrastructure	50
	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	

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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

∟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

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟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

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS46 Install and maintain ESI network infrastructure electrical equipment

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRIS67 Solve problems in energy supply

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	network equipment	
UETTDRIS46	Install and maintain ESI network infrastructure electrical equipment	40
	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	
	∟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	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟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	

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	low voltage electrical apparatus and circuits ∟UEENEEG109A Develop and connect electrical control circuits ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRIS48	Develop high voltage switching schedule Electrical 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 ∟UETTDRIS44 Perform HV field switching operation to a given schedule Transmission Overhead Pathway Group ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus ∟UETTDRIS54 Install and maintain poles, structures	40

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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

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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 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

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UETTDRIS49	Develop low voltage switching schedule	40
	Electrical	
	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	
	∟UETTDRIS43 Perform low voltage field switching operation to a given schedule	
	Transmission Overhead Pathway Group	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟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	

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∟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

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	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 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	
UETTDRIS50	Coordinate power system permit procedures Electrical 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,	40

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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

∟UETTDRIS44 Perform HV field switching operation to a given schedule

∟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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟UETTDRIS52 Install and maintain poles, structures and associated hardware

∟UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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∟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

∟UETTDRRT30 Perform to a given schedule rail traction switching operations

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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟UETTDRIS55 Install and maintain low voltage

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	underground services	
	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	
	∟UETTDRSB39 Perform power system substation switching operation to a given schedule	
UETTDRIS51	Coordinate and direct power system switching schedules	40
	Electrical	
	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.	

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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

∟UETTDRIS44 Perform HV field switching operation to a given schedule

∟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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟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

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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

∟UETTDRRT30 Perform to a given schedule rail traction switching operations

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

∟UETTDRIS43 Perform low voltage field switching operation to a given schedule

∟UETTDRIS55 Install and maintain low voltage underground services

Electrical Pathway Group

∟UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology

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	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 ∟UETTDRSB39 Perform power system substation switching operation to a given schedule	
UETTDRRT34	Install and maintain traction network wiring systems 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	40

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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	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟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	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRRT35	Install and maintain traction network equipment and components	40
	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	

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∟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

∟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

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟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

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system

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	environmental & sustainable energy management policies & procedures	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
	∟UETTDRRT34 Install and maintain traction network wiring systems	
UETTDRRT36	Maintain traction network wiring systems	40
	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	
	∟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	
	∟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	
	∟UETTDREL16 Working safely near live electrical	

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	apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRRT37	Maintain traction network equipment and components	40
	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	
	∟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	
	∟UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits	
	∟UEENEEG109A Develop and connect electrical control circuits	

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	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
	∟UETTDRRT36 Maintain traction network wiring systems	
UETTDRSB39	Perform power system substation switching operation to a given schedule	50
	Electrical	
	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	
	∟UETTDRIS54 Install and maintain poles, structures	

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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

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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 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

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UETTDRTP34	Install/maintain overhead transmission network infrastructure	40
	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	
	∟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	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations	
	∟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	

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	control circuits ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRIS67 Solve problems in energy supply network equipment	
UETTDRTP35	Install/maintain transmission network infrastructure electrical equipment 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 ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits ∟UEENEEG102A Solve problems in low voltage a.c. circuits ∟UEENEEG103A Install low voltage wiring and	40

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	accessories ∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations ∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations ∟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 ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRIS67 Solve problems in energy supply network equipment ∟UETTDRTP34 Install/maintain overhead transmission network infrastructure	
UETTDRTS37	Perform current injection testing using phantom load 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	40

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	∟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	
	∟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	
	∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations	
	∟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	
	∟UEENEEG171A Install, set up and commission interval metering	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
UETTDRTS38	Install and replace high voltage metering and associated equipment	40
	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	

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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

∟UEENEEG076A Install and replace low voltage current transformer metering

∟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

∟UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

∟UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

∟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

∟UEENEEG171A Install, set up and commission interval metering

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRTS37 Perform current injection testing using

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phantom load

Qualification Mapping Information

This qualification replaces and is equivalent to UET40612 Certificate IV in ESI - Power Systems Network Infrastructure

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET50219 Diploma of ESI - Power Systems

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a High Voltage (HV) Substation Project Manager or a Senior Systems Operator (ESI) or a Power Systems Technical Officer.

This qualification covers overseeing the construction of electrical substations and related projects within the ESI. It also includes managing personnel, the business aspects of projects and giving specialist advice to deal with day-to-day issues and problems.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

700 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 270 **weighting points** can be taken from Group A; between 0 and 400 **weighting points** can be taken from Group B; between 0 and 200 **weighting points** can be taken from Group C and between 140 and 900 **weighting points** taken from Group D. You may select all your electives from this group.

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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

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

Core units		**Weighting Points**
UEENEED104A	Use engineering applications software on personal computers ∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems ∟UEENEEE029B Solve electrotechnical problems or ∟UEENEEG102A Solve problems in low voltage a.c. circuits or ∟UEENEEH014B Troubleshoot frequency dependent circuits	60

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UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits and ∟UEENEEG102A Solve problems in low voltage a.c. circuits	60
UETTDREL11	Apply sustainable energy and environmental procedures	20
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS62	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL16 Working safely near live electrical apparatus	30
UETTDRIS63	Implement & monitor power system environmental & sustainable energy management policies & procedures Electrotechnology Pathway Unit Group ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ESI - TDR Pathway Unit Group ∟UETTDREL11 Apply sustainable energy and environmental procedures	30

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Group A: Imported and common elective units		**Weighting Points**
BSBCUS501	Manage quality customer service	40
BSBFIM501	Manage budgets and financial plans	70
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBLED501	Develop a workplace learning environment	60
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBMGT517	Manage operational plan	60
BSBSUS501	Develop workplace policy and procedures for sustainability	50
BSBWOR501	Manage personal work priorities and professional development	60
BSBWOR502	Lead and manage team effectiveness	60

Group B: Qualification elective units		**Weighting Points**
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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.	

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	circuit ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	40
UEENEEH112A	Troubleshoot digital sub-systems ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	80
UEENEEH139A	Troubleshoot basic amplifier circuits ∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components AND ∟UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus OR ∟UEENEEG102A Solve problems in low voltage a.c. circuits	40
UETTDREL15	Respond to power systems technical enquiries and requests	40
UETTDRIS67	Solve problems in energy supply network equipment 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	80

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	∟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	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems	40
	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	

Group C: Qualification elective units		**Weighting Points**
UEENEEE190A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use software for engineering applications	
	∟UEENEEE102A Fabricate, dismantle, assemble of	

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	utilities industry components ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
UEENEEE191A	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software ∟UEENEED104A Use software for engineering applications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications	60
UEENEEE192A	Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software ∟UEENEED104A Use software for engineering applications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications ∟UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	60
UEENEEI155A	Develop structured programs to control external devices ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40

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UETTDRDS31	Draft and layout a power system overhead distribution extension	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS32	Draft and layout a power system underground distribution extension	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS33	Draft and layout a power system street lighting system	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS34	Draft and layout a power system distribution substation minor upgrade	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

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	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

Group D: Qualification elective units		**Weighting Points**
UEENEEC005B	Estimate electrotechnology projects	40
UEENEEC006B	Prepare tender submissions for electrotechnology projects	60
	∟UEENEEC005B Estimate electrotechnology projects	
UEENEER001B	Contribute to the planning of a research project	120
UEENEER002B	Contribute to the conduct of a research project	120
UEENEER003B	Contribute to the development of a product/application/ service	120
UEENEER004B	Contribute to the trial of a product/application/ service	120
UEPOPS507	Conduct project management	60
UEPOPS520	Evaluate cost estimations and initiate appropriate solutions	40
	∟UEENEEC005B Estimate electrotechnology projects	
UETTDRDS35	Design overhead distribution power systems	140
	Common Unit Group	

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	∟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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS36	Design underground distribution power systems	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and	

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	Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS37	Design power system distribution substations	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS38	Design power system public lighting systems	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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	utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS39	Prepare and manage detailed construction plans for electrical power system infrastructure	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	

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	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS42	Investigate quality of power systems supply issues	140
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	

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	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRDS35 Design overhead distribution power systems	
	∟UETTDRDS36 Design underground distribution power systems	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS43	Develop high voltage and low voltage distribution protection systems	150
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

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	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS44	Design power system substations modifications	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS45	Organise and implement ESI line and easement surveys	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	

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	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS46	Develop planned power systems outage strategies	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRDS49	Establish and manage power system geographical information systems data	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

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UETTDRIS66	Manage an electricity power system WHS/OHS management system	140
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus	60
	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	
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems	60
	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	

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	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	
UETTDRIS72	Diagnose and rectify faults in distributed generation systems 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	60

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UETTDRSO36	Develop low voltage distribution switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO37	Develop high voltage distribution and sub-transmission switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and	

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	Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO38	Develop and evaluate power systems transmission switching programs Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules,	150

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	standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO39	Coordinate low voltage distribution networks	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic	

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	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO36 Develop low voltage distribution switching programs	
UETTDRSO40	Coordinate high voltage distribution and sub-transmission networks	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	

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	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
UETTDRSO43	Coordinate low voltage distribution network demand	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

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	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO36 Develop low voltage distribution switching programs	
	∟UETTDRSO39 Coordinate low voltage distribution networks	
UETTDRSO45	Operate and monitor system SCADA equipment	150
	Common Unit Group	
	∟UETTDREL15 Respond to power systems technical enquiries and requests	
UETTDRSO46	Monitor and control the field staff activities	150
	To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment.	
	This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets.	
	NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade.	
	Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.	
UETTDRSO47	Coordinate high voltage transmission network	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	

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	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
UETTDRSO48	Respond to discrete and interdependent protection operations	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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	utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO49	Coordinate power system operations in a regulated energy market	150
	Common Unit Group	

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∟UEENEED104A Use engineering applications software on personal computers

∟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

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

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	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRTS21	Maintain interdependent network protection and control systems	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	

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UETTDRTS22	Commission interdependent network protection and control systems	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	

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UETTDRTS25	Maintain and test and metering schemes	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS26	Commission power systems metering schemes	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications	

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	software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRTS25 Maintain and test and metering schemes ∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS27	Perform accuracy checks on power systems instrument transformers Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers	150

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	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS28	Repair, test and calibrate protection relays and meters	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules,	

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	standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS29	Develop power systems secondary isolation instructional documents Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	150

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS31	Maintain, test and commission power systems voltage regulating equipment	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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.	

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	circuits ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS34	Install and maintain power system communication equipment Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures	150

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	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS35	Maintain complex network protection and control systems	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

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∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRTS21 Maintain interdependent network protection and control systems

∟UETTDRTS29 Develop power systems secondary isolation instructional documents

Qualification Mapping Information

This qualification replaces and is equivalent to UET50212 Diploma of ESI - Power Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET50319 Diploma of ESI - Power Systems Operations

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Power Systems Technical Officer, a High Voltage (HV) Substation Project Manager or a Senior Systems Operator.

This qualification covers designing new overhead and underground powerline systems, overseeing the construction of electrical substations and related projects. These roles may also manage personnel, the business aspects of projects and give specialist advice to deal with day-to-day issues and problems.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **1600 weighting points** comprising:

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

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

Choose a total of 750 **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 360 **weighting points** can be taken from Group B; between 0 and 200 **weighting points** can be taken from Group C and between 190 and 750 **weighting points** taken from Group D. You may select all your electives from this group

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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed

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weighting points will be 10 points.

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

Core units		**Weighting Points**
UEENEED104A	Use engineering applications software on personal computers ∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	40
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems ∟UEENEEE029B Solve electrotechnical problems or ∟UEENEEG102A Solve problems in low voltage a.c. circuits or ∟UEENEEH014B Troubleshoot frequency dependent circuits	60
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and	60

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	Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits and ∟UEENEEG102A Solve problems in low voltage a.c. circuits	60
UETTDREL11	Apply sustainable energy and environmental procedures	20
UETTDREL15	Respond to power systems technical enquiries and requests	40
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS62	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL16 Working safely near live electrical apparatus	30
UETTDRIS63	Implement & monitor power system environmental & sustainable energy management policies & procedures Electrotechnology Pathway Unit Group ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector ESI - TDR Pathway Unit Group ∟UETTDREL11 Apply sustainable energy and environmental procedures	30

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UETTDRSO45	Operate and monitor system SCADA equipment Common Unit Group ∟UETTDREL15 Respond to power systems technical enquiries and requests	150

Group A: Imported and common elective units		**Weighting Points**
BSBCUS501	Manage quality customer service	40
BSBFIM501	Manage budgets and financial plans	70
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBLED501	Develop a workplace learning environment	60
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBMGT517	Manage operational plan	60
BSBSUS501	Develop workplace policy and procedures for sustainability	50
BSBWOR501	Manage personal work priorities and professional development	60
BSBWOR502	Lead and manage team effectiveness	60
TLIF2010	Apply fatigue management strategies	30
TLIF3063	Administer the implementation of fatigue management strategies	50

Group B: Qualification elective units		**Weighting Points**
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40

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UEENEEG006A	Solve problems in single and three phase low voltage machines	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	
UEENEEH112A	Troubleshoot digital sub-systems	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
UEENEEH139A	Troubleshoot basic amplifier circuits	40
	∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
	AND	
	∟UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus	
	OR	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	

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UETTDRIS67	Solve problems in energy supply network equipment	80
	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	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems	40
	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	

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	accessories for low voltage circuits	
	∟UETTDRIS67 Solve problems in energy supply network equipment	
Group C: Qualification elective units		**Weighting Points**
UEENEEI155A	Develop structured programs to control external devices	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UETTDRDS31	Draft and layout a power system overhead distribution extension	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS32	Draft and layout a power system underground distribution extension	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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	utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS33	Draft and layout a power system street lighting system 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 ∟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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system	60

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	environmental & sustainable energy management policies & procedures	
UETTDRDS34	Draft and layout a power system distribution substation minor upgrade	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

Group D: Qualification elective units		**Weighting Points**
UETTDRDS35	Design overhead distribution power systems	140
	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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for	

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	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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS36	Design underground distribution power systems	140
	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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS37	Design power system distribution substations	140
	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	
	∟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	

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	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS38	Design power system public lighting systems	140
	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	
	∟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	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS39	Prepare and manage detailed construction plans for electrical power system infrastructure	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	

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	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS42	Investigate quality of power systems supply issues	140
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRDS35 Design overhead distribution power systems	

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	∟UETTDRDS36 Design underground distribution power systems	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS43	Develop high voltage and low voltage distribution protection systems	150
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system	

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	environmental & sustainable energy management policies & procedures	
UETTDRDS44	Design power system substations modifications	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS45	Organise and implement ESI line and easement surveys	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power	

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	system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS46	Develop planned power systems outage strategies	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRDS49	Establish and manage power system geographical information systems data	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRIS66	Manage an electricity power system WHS/OHS management system	140
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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	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	
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems 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	60

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	network equipment	
	∟UETTDRIS68 Solve problems in energy supply network protection equipment and systems	
	∟UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems	60
	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	
UETTDRIS72	Diagnose and rectify faults in distributed generation systems	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

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	∟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	
UETTDRSO36	Develop low voltage distribution switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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.	

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	circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO37	Develop high voltage distribution and sub-transmission switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	

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	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO38	Develop and evaluate power systems transmission switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

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	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO39	Coordinate low voltage distribution networks	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO36 Develop low voltage distribution switching programs	

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UETTDRSO40	Coordinate high voltage distribution and sub-transmission networks	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
UETTDRSO43	Coordinate low voltage distribution network demand	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications	

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	software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO36 Develop low voltage distribution switching programs	
	∟UETTDRSO39 Coordinate low voltage distribution networks	
UETTDRSO46	Monitor and control the field staff activities	150
	To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be	

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	expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment. This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets. NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade. Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.	
UETTDRSO47	Coordinate high voltage transmission network Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power	150

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	system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
UETTDRSO48	Respond to discrete and interdependent protection operations	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system	

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	environmental & sustainable energy management policies & procedures	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO49	Coordinate power system operations in a regulated energy market	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical	

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	apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRTS21	Maintain interdependent network protection and control systems	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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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	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS22	Commission interdependent network protection and control systems	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS25	Maintain and test and metering schemes	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical	

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	apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS26	Commission power systems metering schemes	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

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	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS25 Maintain and test and metering schemes	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS27	Perform accuracy checks on power systems instrument transformers	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system	

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	environmental & sustainable energy management policies & procedures	
UETTDRTS28	Repair, test and calibrate protection relays and meters	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS29	Develop power systems secondary isolation instructional documents	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications	

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	software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS31	Maintain, test and commission power systems voltage regulating equipment Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	150

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	∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS34	Install and maintain power system communication equipment Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report	150

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS35	Maintain complex network protection and control systems	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic	

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devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRTS21 Maintain interdependent network protection and control systems

∟UETTDRTS29 Develop power systems secondary isolation instructional documents

Qualification Mapping Information

This qualification replaces and is equivalent to UET50312 Diploma of ESI - Power Systems Operations

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET60219 Advanced Diploma of ESI - Power Systems

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Power System Senior Technical Officer or a Power Distribution System Engineer.

This qualification covers high-level managerial, design, testing and system operation functions in the transmission and distribution sectors of the ESI. These roles may also install, commission, maintain, diagnose and repair the hardware and software of complex power system protection, control and metering systems.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **2160 weighting points** comprising:

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

1340 general elective weighting points from the general elective units listed below.

Choose a total of 1340 **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 400 **weighting points** can be taken from Group B; between 0 and 200 **weighting points** can be taken from Group C, between 140 and 900 **weighting points** can be taken from Group D and between 440 and 1200 **weighting points** 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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed weighting points will be 10 points.

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

		Weighting Points
Core units		
UEENEED104A	Use engineering applications software on personal computers ∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	40
UEENEEE083A	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems ∟UEENEEE029B Solve electrotechnical problems or ∟UEENEEG102A Solve problems in low voltage a.c. circuits	60

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	or ∟UEENEEH014B Troubleshoot frequency dependent circuits	
UEENEEG101A	Solve problems in electromagnetic devices and related circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits	60
UEENEEG102A	Solve problems in low voltage a.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	80
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits and ∟UEENEEG102A Solve problems in low voltage a.c. circuits	60
UETTDREL11	Apply sustainable energy and environmental procedures	20
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS62	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UETTDREL16 Working safely near live electrical apparatus	30
UETTDRIS63	Implement & monitor power system environmental & sustainable energy management policies & procedures Electrotechnology Pathway Unit Group ∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	30

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	ESI - TDR Pathway Unit Group	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	

Group A: Imported and common elective units		**Weighting Points**
BSBCUS501	Manage quality customer service	40
BSBFIM501	Manage budgets and financial plans	70
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBLED501	Develop a workplace learning environment	60
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBMGT517	Manage operational plan	60
BSBSUS501	Develop workplace policy and procedures for sustainability	50
BSBWOR501	Manage personal work priorities and professional development	60
BSBWOR502	Lead and manage team effectiveness	60

Group B: Qualification elective units		**Weighting Points**
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE105A Fix and secure electrotechnology equipment	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	
UEENEEH112A	Troubleshoot digital sub-systems	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
UEENEEH139A	Troubleshoot basic amplifier circuits	40
	∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
	AND	
	∟UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus	
	OR	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
UETTDREL15	Respond to power systems technical enquiries and requests	40
UETTDRIS67	Solve problems in energy supply network equipment	80
	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	

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	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	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems 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	40

Group C: Qualification elective units		**Weighting Points**
UEENEED117A	Install and configure network systems for internetworking ∟UEENEEE101A Apply Occupational Health Safety	120

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	regulations, codes and practices in the workplace	
UEENEEI155A	Develop structured programs to control external devices	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UETTDRDS31	Draft and layout a power system overhead distribution extension	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS32	Draft and layout a power system underground distribution extension	60
	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	
	∟UEENEEE107A Use drawings, diagrams, schedules,	

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	standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS33	Draft and layout a power system street lighting system	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

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UETTDRDS34	Draft and layout a power system distribution substation minor upgrade	60
	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	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

Group D: Qualification elective units		**Weighting Points**
UEENEEI156A	Develop and test code for microcontroller devices	60
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
UETTDRDS35	Design overhead distribution power systems	140
	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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS36	Design underground distribution power systems	140
	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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for	

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	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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS37	Design power system distribution substations	140
	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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS38	Design power system public lighting systems	140
	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	
	∟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	

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	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS39	Prepare and manage detailed construction plans for electrical power system infrastructure	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS42	Investigate quality of power systems supply issues	140
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRDS35 Design overhead distribution power	

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	systems ∟UETTDRDS36 Design underground distribution power systems Pathway Unit Group 1 ∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure ∟UETTDRDS45 Organise and implement ESI line and easement surveys Pathway Unit Group 2 ∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS43	Develop high voltage and low voltage distribution protection systems 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 ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	150

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	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS44	Design power system substations modifications	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS45	Organise and implement ESI line and easement surveys	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	

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	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS46	Develop planned power systems outage strategies	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRDS49	Establish and manage power system geographical information systems data	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRIS66	Manage an electricity power system WHS/OHS management system	140
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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	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	
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems 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	60

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	network equipment ∟UETTDRIS68 Solve problems in energy supply network protection equipment and systems ∟UETTDRIS69 Diagnose and rectify faults in energy supply apparatus	
UETTDRIS72	Diagnose and rectify faults in distributed generation systems 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	60
UETTDRSO36	Develop low voltage distribution switching programs Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle	150

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	utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO37	Develop high voltage distribution and sub-transmission switching programs Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy	150

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	sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO38	Develop and evaluate power systems transmission switching programs Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems	150

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO39	Coordinate low voltage distribution networks	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

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	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO36 Develop low voltage distribution switching programs	
UETTDRSO40	Coordinate high voltage distribution and sub-transmission networks	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical	

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	apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
UETTDRSO43	Coordinate low voltage distribution network demand	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

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	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRSO36 Develop low voltage distribution switching programs ∟UETTDRSO39 Coordinate low voltage distribution networks	
UETTDRSO45	Operate and monitor system SCADA equipment Common Unit Group ∟UETTDREL15 Respond to power systems technical enquiries and requests	150
UETTDRSO46	Monitor and control the field staff activities To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment. This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets. NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade. Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.	150
UETTDRSO47	Coordinate high voltage transmission network Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	150

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	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
UETTDRSO48	Respond to discrete and interdependent protection operations	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for	

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	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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO49	Coordinate power system operations in a regulated energy market	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	

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	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRTS21	Maintain interdependent network protection and control systems	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	

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	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS22	Commission interdependent network protection and control systems	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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	utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRTS21 Maintain interdependent network protection and control systems ∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS25	Maintain and test and metering schemes	140
	Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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	

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	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS26	Commission power systems metering schemes	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS25 Maintain and test and metering schemes	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS27	Perform accuracy checks on power systems instrument transformers	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for	

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	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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS28	Repair, test and calibrate protection relays and meters	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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.	

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	circuits ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS29	Develop power systems secondary isolation instructional documents Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures	150

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	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS31	Maintain, test and commission power systems voltage regulating equipment	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

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	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS34	Install and maintain power system communication equipment	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

Group E: Qualification elective units	**Weighting Points**

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UETTDRDS40	Prepare and appraise power systems financial impact statements	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Testing Pathway Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS22 Commission interdependent network protection and control systems	

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	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
	∟UETTDRTS35 Maintain complex network protection and control systems	
	Design Pathway Unit Group	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
UETTDRDS41	Manage electrical power systems infrastructure projects	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Testing Pathway Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic	

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	engineering computational problems	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS22 Commission interdependent network protection and control systems	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
	∟UETTDRTS35 Maintain complex network protection and control systems	
	Design Pathway Unit Group	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
UETTDRDS47	Review power system asset management strategies	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Testing Pathway Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	

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	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS22 Commission interdependent network protection and control systems	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
	∟UETTDRTS35 Maintain complex network protection and control systems	
	Design Pathway Unit Group	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
UETTDRDS48	Analyse and appraise power system fault and outage data	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	

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	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS50	Design customer power system substations	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UEENEEE104A Solve problems in d.c. circuits	

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
	Pathway Unit Group 3	
	∟UETTDRDS44 Design power system substations modifications	
UETTDRDS51	Manage power system transmission and sub-transmission design process	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management	

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	policies & procedures	
UETTDRDS52	Design power system transmission, sub-transmission and zone substation buildings	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS53	Design power system transmission and sub-transmission substation primary plant	180
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	

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	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS54	Design power system transmission and sub-transmission protection and control	180
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures	

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	and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS55	Design power system transmission and sub-transmission substation earthing	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS56	Design power system transmission, sub-transmission & zone substation civil & structural components	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS57	Design power system overhead transmission systems	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	

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	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS58	Design underground transmission systems	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems	60
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

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	∟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	
UETTDRIS73	Develop engineering solutions for energy supply power transformer problems 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	60

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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	
UETTDRSO32	Manage power systems network faults	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	

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∟UEENEEG101A Solve problems in electromagnetic devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

∟UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO47 Coordinate high voltage transmission network

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	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO33	Manage power systems critical events	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to	

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problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO32 Manage power systems network faults

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

∟UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

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	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO34	Control power systems generating plant	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical	

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	apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO48 Respond to discrete and interdependent protection operations	
	∟UETTDRSO49 Coordinate power system operations in a regulated energy market	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO35	Manage high voltage distribution and sub-transmission network demand	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO48 Respond to discrete and interdependent protection operations	
	∟UETTDRSO49 Coordinate power system operations in a regulated energy market	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO41	Manage power systems transmission networks	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	

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∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO47 Coordinate high voltage transmission network

UETTDRSO42	Manage power systems transmission network demand	180

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Common Unit Group

∟UEENEED104A Use engineering applications software on personal computers

∟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

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

Distribution and Sub-transmission Pathway Unit Group

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	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO44	Develop crisis power systems management plans	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	

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∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO32 Manage power systems network faults

∟UETTDRSO33 Manage power systems critical events

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

∟UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

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	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO50	Respond to complex power system protection operations	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

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∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO42 Manage power systems transmission network demand

∟UETTDRSO47 Coordinate high voltage transmission network

UETTDRSO51	Manage network systems power flows	180

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Common Unit Group

∟UEENEED104A Use engineering applications software on personal computers

∟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

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO32 Manage power systems network faults

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations

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	in a regulated energy market	
	∟UETTDRSO50 Respond to complex power system protection operations	
	Generation/Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO34 Control power systems generating plant	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Generation/Transmission Pathway Unit Group	
	∟UETTDRSO34 Control power systems generating plant	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRTS23	Conduct evaluation of power system substation faults	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	

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	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS24	Design testing and commissioning procedures for field devices and substations	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	

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∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Protection Relays and Meters Pathway Unit Group

∟UETTDRTS28 Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

∟UETTDRTS25 Maintain and test and metering schemes

∟UETTDRTS26 Commission power systems metering schemes

∟UETTDRTS29 Develop power systems secondary isolation instructional documents

Primary Plant Pathway Unit Group

∟UETTDRTS29 Develop power systems secondary isolation instructional documents

∟UETTDRTS32 Conduct evaluation of power systems primary plant

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	Protection Systems Pathway Unit Group ∟UETTDRTS21 Maintain interdependent network protection and control systems ∟UETTDRTS29 Develop power systems secondary isolation instructional documents ∟UETTDRTS35 Maintain complex network protection and control systems	
UETTDRTS30	Design power systems secondary isolation instructional documents Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system	160

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	environmental & sustainable energy management policies & procedures	
UETTDRTS32	Conduct evaluation of power systems primary plant	160
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS33	Undertake power systems project management of substation augmentation and maintenance	180

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Common Unit Group

∟UEENEED104A Use engineering applications software on personal computers

∟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

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Protection Relays and Meters Pathway Unit Group

∟UETTDRTS28 Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

∟UETTDRTS25 Maintain and test and metering schemes

∟UETTDRTS26 Commission power systems metering

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	schemes	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
	Primary Plant Pathway Unit Group	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
	∟UETTDRTS32 Conduct evaluation of power systems primary plant	
	Protection Systems Pathway Unit Group	
	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
	∟UETTDRTS35 Maintain complex network protection and control systems	
UETTDRTS35	Maintain complex network protection and control systems	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to	

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	problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRTS21 Maintain interdependent network protection and control systems ∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS36	Commission complex network protection and control systems Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	180

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∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRTS21 Maintain interdependent network protection and control systems

∟UETTDRTS22 Commission interdependent network protection and control systems

∟UETTDRTS29 Develop power systems secondary isolation instructional documents

∟UETTDRTS35 Maintain complex network protection and control systems

Qualification Mapping Information

This qualification replaces and is equivalent to UET60212 Advanced Diploma of ESI - Power Systems

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UET60319 Advanced Diploma of ESI - Power Systems Operations

Modification History

Release 1. This is the first release of this qualification in the UET Transmission, Distribution and Rail Sector Training Package

Qualification Description

This qualification provides the skills and knowledge to work in the electricity supply industry (ESI) as a Power Systems Senior Technical Officer or a Power Transmission and Distribution System Engineer.

This qualification covers high-level managerial, design, testing and system operation functions in the transmission and distribution sectors of the ESI. These roles may also install, commission, maintain, diagnose and repair the hardware and software of complex power system protection, control and metering systems.

The skills and knowledge described within the units in this qualification may require a licence or permit to practice in the workplace.

Additional and/or other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing the qualification.

Entry Requirements

There are no entry requirements for this qualification

Packaging Rules

A total of **2060 weighting points** comprising:

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

1090 general elective weighting points from the general elective units listed below.

Choose a total of 1090 **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 360 **weighting points** can be taken from Group B; between 0 and 200 **weighting points** can be taken from Group C and between 140 and 650 **weighting points** can be taken from Group D and between 440 and 950 **weighting points** 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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide, if not listed

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weighting points will be 10 points.

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

Core units		**Weighting Points**
UEENEED104A	Use engineering applications software on personal computers ∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	40
UEENEEE083A	Establish and follow a competency development plan in an electrotechnology engineering discipline	120
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace	20
UEENEEE104A	Solve problems in d.c. circuits ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	80
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UEENEEE124A	Compile and produce an energy sector detailed report	60
UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems	60
UEENEEE126A	Provide solutions to basic engineering computational problems ∟UEENEEE029B Solve electrotechnical problems or ∟UEENEEG102A Solve problems in low voltage a.c. circuits or ∟UEENEEH014B Troubleshoot frequency dependent circuits	60
UEENEEG101A	Solve problems in electromagnetic devices and related	60

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	circuits	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
UEENEEG102A	Solve problems in low voltage a.c. circuits	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
UEENEEG149A	Provide engineering solutions to problems in complex polyphase power circuits	60
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	and	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
UETTDREL11	Apply sustainable energy and environmental procedures	20
UETTDREL15	Respond to power systems technical enquiries and requests	40
UETTDREL16	Working safely near live electrical apparatus	20
UETTDRIS62	Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	30
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UETTDREL16 Working safely near live electrical apparatus	
UETTDRIS63	Implement & monitor power system environmental & sustainable energy management policies & procedures	30
	Electrotechnology Pathway Unit Group	
	∟UEENEEK142A Apply environmentally and sustainable procedures in the energy sector	
	ESI - TDR Pathway Unit Group	
	∟UETTDREL11 Apply sustainable energy and	

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	environmental procedures	
UETTDRSO45	Operate and monitor system SCADA equipment Common Unit Group ∟UETTDREL15 Respond to power systems technical enquiries and requests	150

Group A: Imported and common elective units		**Weighting Points**
BSBCUS501	Manage quality customer service	40
BSBFIM501	Manage budgets and financial plans	70
BSBINM501	Manage an information or knowledge management system	50
BSBINN502	Build and sustain an innovative work environment	50
BSBLED501	Develop a workplace learning environment	60
BSBMGT502	Manage people performance	70
BSBMGT516	Facilitate continuous improvement	60
BSBMGT517	Manage operational plan	60
BSBSUS501	Develop workplace policy and procedures for sustainability	50
BSBWOR501	Manage personal work priorities and professional development	60
BSBWOR502	Lead and manage team effectiveness	60
TLIF2010	Apply fatigue management strategies	30
TLIF3063	Administer the implementation of fatigue management strategies	50

Group B: Qualification elective units		**Weighting Points**
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components ∟UEENEEE101A Apply Occupational Health and	40

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	Safety regulations, codes and practices in the workplace	
UEENEEG006A	Solve problems in single and three phase low voltage machines	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of electrotechnology 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. circuit	
	∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	
UEENEEH102A	Repairs basic electronic apparatus faults by replacement of components	40
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, dismantle, assemble of utilities industry components	
UEENEEH112A	Troubleshoot digital sub-systems	80
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
UEENEEH139A	Troubleshoot basic amplifier circuits	40
	∟UEENEEH102A Repair basic electronic apparatus faults by replacement of components	
	AND	
	∟UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus	
	OR	
	∟UEENEEG102A Solve problems in low voltage a.c.	

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	circuits	
UETTDRIS67	Solve problems in energy supply network equipment	80
	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	
UETTDRIS68	Solve problems in energy supply network protection equipment and systems	40
	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	

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	phase low voltage machines ∟UEENEEG106A Terminate cables, cords and accessories for low voltage circuits ∟UETTDRIS67 Solve problems in energy supply network equipment	

Group C: Qualification elective units		**Weighting Points**
UEENEED117A	Install and configure network systems for internetworking ∟UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace	120
UEENEEI155A	Develop structured programs to control external devices ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	40
UETTDRDS31	Draft and layout a power system overhead distribution extension 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 ∟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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	60

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UETTDRDS32	Draft and layout a power system underground distribution extension 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 ∟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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	60
UETTDRDS33	Draft and layout a power system street lighting system 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 ∟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 ∟UETTDREL11 Apply sustainable energy and	60

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	environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS34	Draft and layout a power system distribution substation minor upgrade 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 ∟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 ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	60

Group D: Qualification elective units		**Weighting Points**
UEENEEI156A	Develop and test code for microcontroller devices ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	60

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UETTDRDS35	Design overhead distribution power systems	140
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	

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UETTDRDS36	Design underground distribution power systems	140
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	

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UETTDRDS37	Design power system distribution substations	140
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	

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UETTDRDS38	Design power system public lighting systems	140
	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	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	

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UETTDRDS39	Prepare and manage detailed construction plans for electrical power system infrastructure	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS42	Investigate quality of power systems supply issues	140
	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	
	∟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.	

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	circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRDS35 Design overhead distribution power systems	
	∟UETTDRDS36 Design underground distribution power systems	
	Pathway Unit Group 1	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
UETTDRDS43	Develop high voltage and low voltage distribution protection systems	150
	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	
	∟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	

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	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS44	Design power system substations modifications	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS45	Organise and implement ESI line and easement surveys	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS46	Develop planned power systems outage strategies	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRDS49	Establish and manage power system geographical information systems data	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE107A Use drawings, diagrams, schedules,	

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	standards, codes and specifications ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
UETTDRIS66	Manage an electricity power system WHS/OHS management system	140
UETTDRIS69	Diagnose and rectify faults in energy supply apparatus 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	60
UETTDRIS70	Diagnose and rectify faults in electrical energy distribution systems Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	60

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	∟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	
UETTDRIS71	Diagnose and rectify faults in electrical energy supply transmission systems	60
	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	

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	∟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	
UETTDRIS72	Diagnose and rectify faults in distributed generation systems	60
	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	
UETTDRSO36	Develop low voltage distribution switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO37	Develop high voltage distribution and sub-transmission switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	

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	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO38	Develop and evaluate power systems transmission switching programs	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic	

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	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRSO39	Coordinate low voltage distribution networks	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to	

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	problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRSO36 Develop low voltage distribution switching programs	
UETTDRSO40	Coordinate high voltage distribution and sub-transmission networks Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures	150

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	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
UETTDRSO43	Coordinate low voltage distribution network demand	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures	

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	and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRSO36 Develop low voltage distribution switching programs ∟UETTDRSO39 Coordinate low voltage distribution networks	
UETTDRSO46	Monitor and control the field staff activities To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision-making, whilst in an individual environment. This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets. NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade. Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program shall be used to ensure equivalence of entry.	150
UETTDRSO47	Coordinate high voltage transmission network Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟UEENEEE125A Provide engineering solutions for	150

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	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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
UETTDRSO48	Respond to discrete and interdependent protection operations Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems	150

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO49	Coordinate power system operations in a regulated energy market	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy	

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	sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRTS21	Maintain interdependent network protection and control systems	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle	

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	utilities industry components ∟UEENEEE104A Solve problems in d.c. circuits ∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications ∟UEENEEE124A Compile and produce an energy sector detailed report ∟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 ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures ∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS22	Commission interdependent network protection and control systems Common Unit Group ∟UEENEED104A Use engineering applications software on personal computers ∟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 ∟UEENEEE107A Use drawings, diagrams, schedules,	150

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	standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS25	Maintain and test and metering schemes	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy	

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	sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS26	Commission power systems metering schemes	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic	

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	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRTS25 Maintain and test and metering schemes	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
UETTDRTS27	Perform accuracy checks on power systems instrument transformers	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	

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	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS28	Repair, test and calibrate protection relays and meters	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

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	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS29	Develop power systems secondary isolation instructional documents	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power	

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	system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRTS31	Maintain, test and commission power systems voltage regulating equipment	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

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UETTDRTS34	Install and maintain power system communication equipment	150
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	

Group E: Qualification elective units		**Weighting Points**
UETTDRDS40	Prepare and appraise power systems financial impact statements	160
	Common Unit Group	

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∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

∟UEENEEE104A Solve problems in d.c. circuits

∟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

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Testing Pathway Unit Group

∟UEENEED104A Use engineering applications software on personal computers

∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE124A Compile and produce an energy sector detailed report

∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

∟UEENEEE126A Provide solutions to basic engineering computational problems

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDRTS21 Maintain interdependent network protection and control systems

∟UETTDRTS22 Commission interdependent network protection and control systems

∟UETTDRTS29 Develop power systems secondary isolation instructional documents

∟UETTDRTS35 Maintain complex network protection

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	and control systems	
	Design Pathway Unit Group	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
UETTDRDS41	Manage electrical power systems infrastructure projects	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Testing Pathway Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	

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	∟UETTDRTS21 Maintain interdependent network protection and control systems	
	∟UETTDRTS22 Commission interdependent network protection and control systems	
	∟UETTDRTS29 Develop power systems secondary isolation instructional documents	
	∟UETTDRTS35 Maintain complex network protection and control systems	
	Design Pathway Unit Group	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
UETTDRDS47	Review power system asset management strategies	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Testing Pathway Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE124A Compile and produce an energy	

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	sector detailed report ∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits ∟UEENEEE126A Provide solutions to basic engineering computational problems ∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits ∟UETTDRTS21 Maintain interdependent network protection and control systems ∟UETTDRTS22 Commission interdependent network protection and control systems ∟UETTDRTS29 Develop power systems secondary isolation instructional documents ∟UETTDRTS35 Maintain complex network protection and control systems Design Pathway Unit Group ∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
UETTDRDS48	Analyse and appraise power system fault and outage data Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟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 ∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power	150

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	system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS50	Design customer power system substations	140
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	Pathway Unit Group 1	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	Pathway Unit Group 2	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic	

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	engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	
	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDRDS43 Develop high voltage and low voltage distribution protection systems	
	Pathway Unit Group 3	
	∟UETTDRDS44 Design power system substations modifications	
UETTDRDS51	Manage power system transmission and sub-transmission design process	150
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS52	Design power system transmission, sub-transmission and zone substation buildings	160

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	Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟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 ∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure ∟UETTDRDS44 Design power system substations modifications ∟UETTDREL11 Apply sustainable energy and environmental procedures ∟UETTDREL16 Working safely near live electrical apparatus ∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs ∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS53	Design power system transmission and sub-transmission substation primary plant	180
	Common Unit Group ∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace ∟UEENEEE104A Solve problems in d.c. circuits ∟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 ∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system	

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	infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS54	Design power system transmission and sub-transmission protection and control	180
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management	

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	policies & procedures	
UETTDRDS55	Design power system transmission and sub-transmission substation earthing	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS56	Design power system transmission, sub-transmission & zone substation civil & structural components	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEG101A Solve problems in electromagnetic devices and related circuits	

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	∟UEENEEG102A Solve problems in low voltage a.c. circuits	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS44 Design power system substations modifications	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS57	Design power system overhead transmission systems	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures	

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	and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRDS58	Design underground transmission systems	160
	Common Unit Group	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	
	∟UEENEEE104A Solve problems in d.c. circuits	
	∟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	
	∟UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure	
	∟UETTDRDS45 Organise and implement ESI line and easement surveys	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
UETTDRIS73	Develop engineering solutions for energy supply power transformer problems	60
	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	

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	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	
	∟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	
UETTDRSO32	Manage power systems network faults	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

∟UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and

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	sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Generation/Transmission Pathway Unit Group	
	∟UETTDRSO34 Control power systems generating plant	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO33	Manage power systems critical events	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy	

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sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO32 Manage power systems network faults

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

∟UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

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	Generation/Transmission Pathway Unit Group	
	∟UETTDRSO34 Control power systems generating plant	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO34	Control power systems generating plant	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	

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	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO48 Respond to discrete and interdependent protection operations	
	∟UETTDRSO49 Coordinate power system operations in a regulated energy market	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO35	Manage high voltage distribution and sub-transmission network demand	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace	

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∟UEENEEE102A Fabricate, assemble and dismantle utilities industry components

∟UEENEEE104A Solve problems in d.c. circuits

∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

∟UEENEEE124A Compile and produce an energy sector detailed report

∟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

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

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	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO41	Manage power systems transmission networks	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO48 Respond to discrete and interdependent protection operations	
	∟UETTDRSO49 Coordinate power system operations in a regulated energy market	

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	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO42	Manage power systems transmission network demand	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures	

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	and programs	
	∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO48 Respond to discrete and interdependent protection operations	
	∟UETTDRSO49 Coordinate power system operations in a regulated energy market	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO44	Develop crisis power systems management plans	140
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits	
	∟UEENEEE126A Provide solutions to basic engineering computational problems	
	∟UEENEEG101A Solve problems in electromagnetic	

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devices and related circuits

∟UEENEEG102A Solve problems in low voltage a.c. circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO32 Manage power systems network faults

∟UETTDRSO33 Manage power systems critical events

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

∟UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

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	∟UETTDRSO47 Coordinate high voltage transmission network	
	Distribution and Sub-transmission Pathway Unit Group	
	∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand	
	∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs	
	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO50	Respond to complex power system protection operations	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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.	

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circuits

∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

∟UETTDREL11 Apply sustainable energy and environmental procedures

∟UETTDREL16 Working safely near live electrical apparatus

∟UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

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	∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks	
	Transmission Pathway Unit Group	
	∟UETTDRSO38 Develop and evaluate power systems transmission switching programs	
	∟UETTDRSO41 Manage power systems transmission networks	
	∟UETTDRSO42 Manage power systems transmission network demand	
	∟UETTDRSO47 Coordinate high voltage transmission network	
UETTDRSO51	Manage network systems power flows	180
	Common Unit Group	
	∟UEENEED104A Use engineering applications software on personal computers	
	∟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	
	∟UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
	∟UEENEEE124A Compile and produce an energy sector detailed report	
	∟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	
	∟UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits	
	∟UETTDREL11 Apply sustainable energy and environmental procedures	
	∟UETTDREL16 Working safely near live electrical apparatus	
	∟UETTDRIS62 Implement and monitor the power	

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system organisational WHS/OHS policies, procedures and programs

∟UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

∟UETTDRSO32 Manage power systems network faults

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO48 Respond to discrete and interdependent protection operations

∟UETTDRSO49 Coordinate power system operations in a regulated energy market

∟UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

∟UETTDRSO34 Control power systems generating plant

∟UETTDRSO38 Develop and evaluate power systems transmission switching programs

∟UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

∟UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

∟UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

∟UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

∟UETTDRSO38 Develop and evaluate power systems

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transmission switching programs

∟UETTDRSO41 Manage power systems transmission networks

∟UETTDRSO42 Manage power systems transmission network demand

∟UETTDRSO47 Coordinate high voltage transmission network

Qualification Mapping Information

This qualification replaces and is equivalent to UET60312 Advanced Diploma of ESI - Power Systems Operations

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETTDRCJ21 Lay ESI electrical cables

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 lay electrical supply industry (ESI) electrical cables.

It includes the direct laying of cables in trenches, on trays/racks, in troughs and/or in conduit or ducts. It also includes cable pulling methods, pulling tensions, minimum bending radii, reduction of frictional forces, use of supporting plant (e.g. dynamometers, rigging and winches), working on fire rated cable (FRC), polyvinyl chloride (PVC), air conditioning (A/C) ducted systems and using plant and equipment for laying and sealing ESI electrical cables.

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 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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Cable Jointing

Unit Sector

Not applicable.

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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 lay ESI electrical cables	**1.1** 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 the laying of electrical cables 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 WHS/OHS and environmental hazards are identified, WHS/OHS risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant permits are confirmed and signed 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 Work site 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 the laying of ESI electrical cables	**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

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	2.3	Electrical cables are laid and sealed in accordance with workplace procedures
	2.4	Unplanned events are responded to in accordance with workplace procedures
	2.5	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete laying of ESI electrical cables	**3.1**	Completed work is checked against work plan, 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	Work site is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.4	Tools, equipment and surplus resources are, where appropriate, cleaned, checked and returned to storage 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 UETTDRCJ21A Lay ESI electrical cables.

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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 UETTDRCJ21 Lay ESI electrical cables

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
- laying at least one (1) of the following:
  - high voltage (HV) polymeric
  - HV paper insulated
- laying at least one (1) of the following:
  - low voltage (LV) polymeric
  - LV paper insulated
- laying at least one (1) of the following:
  - direct lay
  - on racks
  - in conduits
- performing at least one (1) of the following cable pulling methods:
  - stocking pulling
  - bond pulling
  - armour pulling
  - nose pull attachments
- performing at least two (2) of the following cable sealing methods:
  - heat shrinkable
  - pre-stretched materials
  - tin/lead wiping
  - pre-moulded components
- using at least one (1) of the following cable cutting tools:
  - hydraulic cutters
  - electric reciprocating

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    - motorised
    - hand tools
- using at least four (4) of the following:
    - drum jacks
    - winches
    - spindles
    - capstans
    - bollards
    - cable trailers
    - rollers
    - lubricants
    - ropes
    - bell mouths
    - draw wires/rods
- 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:

- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- safety precautions specific to the installation of underground cables encompassing:
    - excavation and trench safety regulations
    - gas detection procedures
    - working in confined spaces
    - personal protective equipment (PPE)
    - hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cables
    - gas bottle testing procedures
    - permit to work systems and isolation procedures
    - trench excavation and reinstatement procedures
    - confined space rescue, including:
        - planning and identifying rescue procedures
        - establishing rescue responses and techniques
        - involvement of external emergency services
        - emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- installation of underground cable procedures encompassing:
    - types of tools and equipment

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- methods of cable handling encompassing:
  - direct laid cables
  - duct laid cables
  - solid laid cables
  - cables supported in cleats or hangers
  - corrosion protection
  - minimum bending radius of cables
- methods of cable sealing encompassing:
  - shorting of cables cores
  - core of unterminated cables
  - methods of protection from corrosion
  - polymeric sheathed cables sealing with mastic lined
  - heat shrink caps buried sealed ends
- methods of installing conduits
- procedures for the safe use of LPG equipment for cable jointing
- traffic management, including:
  - purpose of traffic management
  - responsibilities in accordance with relevant statutory requirements
  - electricity supply industry (ESI) requirements
  - procedure used to provide an effective traffic management scheme
  - use of a two-way radio
- procedures for purchasing/ordering items, removing/dispatching items, stocktaking and record keeping
- safety precautions specific to handling underground cables
- requirements for the use of enterprise manuals, system diagrams/plans and drawings
- types and applications of underground cables
- construction types and structures of underground cables
- characteristics of different types of underground cables
- ratings.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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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 PPE currently used in industry for laying ESI electrical cables
- 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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UETTDRCJ22 Install and maintain de-energised low voltage underground paper insulated cables

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 de-energised low voltage (LV) underground paper insulated cables in the electricity supply industry (ESI).

It includes jointing and terminating cables using a range of equipment, tools and materials. It also includes testing, isolating, obtaining electrical access permits and completing relevant documentation.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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 joint and maintain de-energised LV underground paper insulated cables	**1.1** 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 the installation and maintenance of de-energised LV underground paper insulated cables 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 WHS/OHS and environmental hazards are identified, risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed in accordance with workplace procedures

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	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 installation and maintenance of de-energised LV underground paper insulated cables	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed 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	Cables are tested in accordance with workplace procedures
	2.4	Cables are prepared for jointing, terminating or maintaining in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.5	Cables are jointed, terminated or maintained in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.6	De-energised LV underground paper insulated cables are maintained, repaired or replaced in accordance with job schedule, work requirements and workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete the installation and maintenance of de-energised LV underground paper insulated cables	**3.1**	Completed work is checked against work plan, 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 rehabilitated, cleaned up and made safe in accordance with workplace procedures

3.4 Tools, equipment and surplus resources are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with workplace procedures

3.5 Relevant work permits are signed off and LV underground paper insulated cables are 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 UETTDRCJ22A Install and maintain de-energised low voltage underground paper insulated cables.

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 UETTDRCJ22 Install and maintain de-energised low voltage underground paper insulated cables

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
- installing at least one (1) of the following:
  - low voltage (LV) paper/lead sheathed
  - LV paper/aluminium sheathed
- completing at least two (2) of the following cable joints:
  - tee-off joints
  - straight through joints
  - parallel branch joints
  - parallel joints
- completing at least two (2) of the following cable terminations:
  - transformers
  - LV switchboards
  - pillars/turrets
  - lighting columns
  - ring main units
  - chamber substations
  - underground overhead terminations
  - circuit breakers
- using at least one (1) of the following:
  - busbar/termination boxes
  - links/fuses
  - disconnect boxes
  - termination boxes
  - control gear

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- using at least one (1) of the following:
  - resin filled boxes
  - polymeric tape
  - heat shrink
  - ‘slip-on’ moulds
  - pre-stretched polymeric
  - compound filled boxes
- using at least one (1) of the following cable conductor connection methods:
  - compression lugs
  - soldered lugs
  - mechanical connectors
- using at least one (1) of the following:
  - voltage detectors
  - insulation resistance testers
- 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:

- safety precautions specific to handling and jointing underground aluminium and lead cable, including provision of WHS/OHS information, such as material safety data sheets (MSDS)
- requirements for the use of enterprise manuals, system diagrams/plans and drawings
- construction and structure(s) of aluminium and lead cable underground cables
- characteristics of aluminium and lead cable
- ratings
- techniques in the jointing of aluminium and lead sheathed cable
- methods of testing cable after jointing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, facilities, equipment and personal protective equipment (PPE) currently used in industry for installing and maintaining de-energised LV underground paper insulated cables
- 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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UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables

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 de-energised high voltage (HV) underground paper insulated cables in the electricity supply industry (ESI).

It includes completing and updating system data/maintenance records of de-energised HV underground paper insulated cables, jointing, terminating, repairing and replacing cables. It also includes isolating cables, issuing permits and undertaking pre-commissioning tests.

De-energised means separated from all sources of supply but not necessarily isolated, earthed, discharged or out of commission.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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

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UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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 joint and maintain de-energised HV underground paper insulated cables	**1.1** 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 the installation and maintenance of de-energised HV underground paper insulated cables 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 WHS/OHS and environmental hazards are identified, risks are assessed and control measures identified in accordance with workplace procedures

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	1.6	Relevant work permits are obtained, understood and signed 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 installation and maintenance of de-energised HV underground paper insulated cables	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents 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	Cables are tested in accordance with workplace procedures
	2.4	Cables are prepared for jointing, terminating or maintaining in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.5	Cables are jointed, terminated or maintained in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.6	Unplanned events in the installation and maintenance of de-energised HV underground paper insulated cables are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of de-energised HV underground paper insulated cables	**3.1**	Completed work is checked against work plan, 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

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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 are, where appropriate, cleaned, checked and returned to storage 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 UETTDRCJ23A Install and maintain de-energised high voltage underground paper insulated cables.

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 UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables

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
- using at least one (1) of the following:
  - paper/lead sheathed
  - high voltage (HV) paper/aluminium sheathed
- using at least one (1) of the following:
  - straight through joint
  - parallel branch joint
- completing at least one (1) of the following:
  - transformers
  - ring main units
  - chamber substations
- installing at least one (1) of the following:
  - busbar/termination boxes
  - links/fuses
  - termination boxes
  - control gear
- installing at least two (2) of the following:
  - resin filled boxes
  - polymeric tape
  - heat shrink
  - 'slip-on’ moulds
  - pre-stretched polymeric
  - compound filled boxes
- completing at least two (2) of the following:

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  - lugs and ferrules
  - compression joints
  - soldered joints
  - mechanical connectors
- using all of the following:
  - cable identification devices
  - cable spiking devices
- using all of the following:
  - insulation resistance testers
  - moisture testing equipment
- 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:

- requirements for the use of enterprise manuals, system diagrams/plans and drawings
- types of tools and equipment
- types of HV cables
- structure of HV cables
- techniques for the jointing, terminating and repairing of HV paper insulated cables
- methods of testing cables after jointing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 installing and maintaining de-energised HV underground paper insulated cables
- applicable documentation, including workplace procedures, relevant industry standards,

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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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UETTDRCJ24 Joint and maintain energised low voltage underground paper insulated cables

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 joint and maintain energised low voltage (LV) underground paper insulated cables in the electricity supply industry (ESI).

It includes jointing and terminating energised cables using a range of specialised equipment and tools. It also includes the testing of cables before and after jointing and terminating, obtaining relevant permits and preparing relevant work documentation.

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 work 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

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

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UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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 joint and maintain LV underground paper insulated cables	**1.1** 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 the jointing and maintenance of energised LV underground paper insulated cables are obtained and confirmed for the purposes of the work to be performed and
	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 WHS/OHS and environmental hazards are identified, risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed in accordance with workplace procedures
	1.7 Plant, equipment, tools and personal protective equipment (PPE) required for work are identified,

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		obtained and confirmed in working order
	1.8	Work site is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out jointing and maintenance of energised LV underground paper insulated cables	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents 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	Cables are tested in accordance with workplace procedures
	2.4	Cables are prepared for jointing, terminating or maintaining in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.5	Cables are jointed, terminated and maintained in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete jointing and maintenance of energised LV underground paper insulated cables	**3.1**	Completed work is checked against work plan, 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	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with workplace procedures
	3.4	Relevant work permits are signed off and energised LV underground paper insulated cables are returned to service in accordance with workplace procedures

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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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRCJ24A Joint and maintain energised low voltage underground paper insulated cables.

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 UETTDRCJ24 Joint and maintain energised low voltage underground paper insulated cables

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
- using at least one (1) of the following:
  - low voltage (LV) paper/lead
  - LV paper/aluminium
- completing at least two (2) of the following cable joints:
  - tee-off joints
  - straight through joints
  - parallel branch
- completing at least one (1) of the following cable terminations:
  - transformers
  - LV switchboards
  - pillars/turrets
  - lighting columns
  - ring main units
  - chamber substations
  - busbar/termination boxes
  - links
  - termination boxes
  - control gear
- installing at least one (1) of the following:
  - resin filled boxes
  - compound filled boxes
  - polymeric tape
  - heat shrink

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  - ‘slip-on’ moulds
  - pre-stretched polymeric
- using at least two (2) of the following:
  - compression joints
  - soldered joints
  - mechanical connectors
  - soldered lugs
  - compression lugs
- using all of the following:
  - voltage detecting instruments
  - insulation resistance testers
  - cable identification equipment
  - moisture testing equipment
  - phase rotation instruments
  - specialised live working equipment/tools
- use all of the following:
  - temporary earth bonding/bridging
  - insulating covers/matting
  - insulating tooling/gloves
- 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:

- standards, codes, Commonwealth, state/territory/local government legislation, supply authority regulations and/or enterprise requirements
- safety precautions specific to working on or near energised low voltage conductors encompassing:
  - 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 paper lead cables encompassing:
  - 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 paper lead cables.

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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 PPE currently used in industry for jointing and maintaining energised LV underground paper insulated cables
- 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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UETTDRCJ25 Perform straight through high voltage paper insulated to polymeric transition joint

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 straight through high voltage (HV) paper insulated cable to polymeric transition joint cable in the electricity supply industry (ESI).

It includes the formation of a HV/low voltage (LV) transition joint(s) from paper insulated to polymeric cable on belted and screened cables, the determination of electrical values of belt papers and core insulation, protection of core and belt papers prior to setting, core setting, termination of belt papers, construction of bell mouth and moisture testing.

It also includes isolation of systems and circuits, the procedures of issuing/accepting electrical access permits, undertaking pre-commissioning and/or re-commissioning tests and updating system data/maintenance records.

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

UEENEEE104 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

UETTDRCJ21 Lay ESI electrical cables

UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables

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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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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 joint HV paper insulated cables to HV polymeric cables	**1.1** 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 the formation of a paper insulated to polymeric transition joint 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 WHS/OHS and environmental hazards are identified, risks are assessed and control measures identified in

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		accordance with workplace procedures
	1.6	Relevant work permits are obtained, understood and signed 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 jointing of HV paper insulated cable to HV polymeric cable	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents 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	Systems and circuits are isolated as required, proved safe to work on in accordance with workplace procedures
	2.4	Cables are prepared for jointing, terminating or maintaining in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.5	Cables are jointed, terminated or maintained in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete jointing of HV paper insulated cable to HV polymeric cable	**3.1**	Completed work is checked against work plan, 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

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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 are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures

3.5 Relevant work permits are signed off and HV/LV underground paper insulated/polymeric cables are 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 UETTDRCJ25A Perform straight through high voltage paper insulated to polymeric transition joint.

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 UETTDRCJ25 Perform straight through high voltage paper insulated to polymeric transition joint

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 at least two (2) of the following:
  - high voltage (HV) polymeric to PLY
  - HV polymeric to paper/Al sheathed
  - low voltage (LV) transition
- completing at least two (2) of the following:
  - straight through joint
  - straight through trifurcating joint
  - parallel branch joint
  - parallel trifurcating transition
  - parallel transition
- using at least two (2) of the following:
  - polymeric tape
  - heat shrink
  - ‘slip-on’ moulds
  - pre-stretched polymeric resin
- using at least two (2) of the following cable conductor connection methods:
  - compression joints
  - soldered joints
  - mechanical connectors
  - welding conductors
  - insulating piercing connectors
- 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:

- safety precautions specific to handling and jointing underground aluminium and lead cables, including provision of WHS/OHS information, such as material safety data sheets (MSDS)
- requirements for the use of enterprise manuals, system diagrams/plans and drawings
- types of tools and equipment
- techniques for the jointing of transition joint between cross-linked polyethylene (XLPE) and lead sheathed, paper insulated cables
- methods of testing cable after jointing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 straight through jointing of HV paper insulated to polymeric transition joints
- 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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UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables

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 de-energised low voltage (LV) underground polymeric cables in the electricity supply industry (ESI).

It includes jointing, terminating, repairing and replacing cables using a range of equipment, tools and materials. It also includes the isolation of systems and circuits, issuing/accepting electrical access permits, undertaking pre-commissioning and/or re-commissioning tests and updating system data/maintenance records.

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

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDRCJ21 Lay ESI electrical cables

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Cable Jointing

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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 install and maintain de-energised LV underground polymeric cables	**1.1** Work plan, construction plans, drawings, workplace procedures and material lists are received, confirmed and communicated with relevant personnel
	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 the installation and maintenance of de-energised LV underground polymeric cables 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 WHS/OHS and environmental hazards are identified, WHS/OHS risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed 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

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2 Carry out the installation and maintenance of de-energised LV underground polymeric cables	**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	Systems and circuits are isolated as required, proved safe to work on in accordance with workplace procedures
	2.4	De-energised LV underground polymeric cables are installed in accordance with the work schedule and workplace procedures
	2.5	Maintenance, including repair and/or replacement of de-energised LV underground polymeric cables is carried out in accordance with the work schedule and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of de-energised LV underground polymeric cables	**3.1**	Completed work is checked against work plan, 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 are, where appropriate, are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are signed off and LV underground polymeric cables are returned to service in accordance with workplace procedures

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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 UETTDRCJ26A Install and maintain de-energised low voltage underground polymeric cables.

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 UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables

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
- installing and maintaining the following:
  - low voltage (LV) polymeric cable
- completing at least two (2) of the following:
  - tee-off joints
  - straight through joints
  - parallel branch joints
  - parallel joints
- installing at least one (1) of the following:
  - transformers
  - LV switchboards
  - pillars/turrets
  - lighting columns
  - ring main units
  - chamber substations
- using terminating substation equipment on at least two (2) of the following:
  - busbar/termination boxes
  - links/fuses
  - disconnect boxes
  - termination boxes
  - control gear
  - underground/overhead terminations
  - circuit breakers
- using at least one (1) of the following terminating materials:

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  - resin filled boxes
  - compound filled boxes
  - polymeric tape
  - heat shrink
  - 'slip-on’ moulds
  - pre-stretched polymeric
- use at least one (1) of the following cable conductor connection methods:
  - compression lugs
  - welded connections
  - mechanical connectors
  - insulation piercing connectors
- using all of the following:
  - insulation resistance testers
  - voltage detectors
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of LV polymeric cables
- types of jointing tools
- techniques in the use of liquid petroleum gas (LPG) encompassing:
  - safety precautions
  - personal protective equipment (PPE)
  - general maintenance and repair
- techniques in jointing LV cross-linked polyethylene (XLPE) cables encompassing:
  - straight through joint
  - jointing different types of cable
  - service and street light cable joints
- techniques in terminating LV XLPE encompassing:
  - pole top terminations
  - substation terminations
  - distribution pillar/column/cubicle terminations
  - service and street light cable terminations
- techniques in repairing LV XLPE cable encompassing:
  - different types of damage
  - repairs to sheath
  - repairs to cores

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- methods of testing cable after jointing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 installing and maintaining de-energised LV underground polymeric cables
- 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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UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables

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 de-energised high voltage (HV) underground polymeric cables in the electricity supply industry (ESI).

It includes jointing, terminating, repairing and replacing cables; isolating systems and circuits and following procedures of for accepting electrical access permits. It also includes using equipment, tools and materials; undertaking pre-commissioning and/or re-commissioning tests and updating system data/maintenance records.

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

UEENEEE101 Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDRCJ21 Lay ESI electrical cables

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Cable Jointing

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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 install and maintain de-energised HV underground polymeric cables	**1.1** Work plan, construction plans, drawings, workplace procedures and material lists are received, confirmed and communicated with relevant personnel
	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 the installation and maintenance of de-energised HV underground polymeric cables 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 WHS/OHS and environmental hazards are identified, WHS/OHS risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed 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

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2 Carry out the installation and maintenance of de-energised HV underground polymeric cables	**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	Systems and circuits are isolated as required, proved safe to work on in accordance with workplace procedures
	2.4	De-energised HV underground polymeric cables are installed in accordance with the work schedule and workplace procedures
	2.5	Maintenance, including repair and/or replacement of de-energised HV underground polymeric cables is carried out in accordance with the work schedule and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of de-energised HV underground polymeric cables	**3.1**	Completed work is checked against work plan, 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 are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are signed off and HV underground polymeric cables are returned to service in accordance with workplace procedures

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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 UETTDRCJ27A Install and maintain de-energised high voltage underground polymeric cables.

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 UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables

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
- installing and maintaining the following:
  - high voltage (HV) polymeric cables
- performing at least two (2) of the following cable joints:
  - tee-off joints
  - straight through joint
  - parallel branch joint
  - parallel joint
- completing cable terminations on distribution network equipment on at least one (1) of the following:
  - transformers
  - ring main units
  - chamber substations
- using at least one (1) of the following terminating substation equipment:
  - busbar/termination boxes
  - links/fuses
  - termination boxes
  - control gear
  - circuit breakers
- using at least two (2) of the following:
  - resin filled boxes
  - compound filled boxes
  - polymeric tape
  - heat shrink
  - ‘slip-on’ moulds

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    - pre-stretched polymeric
- using all of the following:
    - insulation resistance testers
    - voltage detectors
- using all of the following:
    - cable identification devices
    - cable spiking devices
- using at least two (2) of the following:
    - mechanical connectors
    - compression connectors
    - lugs
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of HV underground polymeric cables
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings encompassing:
    - characteristics of different types of cables and components
    - purpose of stress control
- applications of various tools and equipment for HV jointing
- procedures for isolating HV underground cables encompassing:
    - method for proving safe to work
- earthing procedures
- techniques in jointing HV underground polymeric cable, encompassing:
    - short circuit cores and seal cable
    - straight through
    - trifurcating
- techniques in HV terminations encompassing:
    - pole top termination
    - substation/switchgear termination
    - ABC termination
    - telcon termination
- procedures for repairing HV underground cables encompassing:
    - location of faults
    - types of damage
    - techniques to repairs to sheath

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- techniques to repairs to core.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 installing and maintaining de-energised HV underground polymeric cables
- 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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UETTDRCJ28 Joint and maintain energised low voltage underground polymeric cables

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 joint and maintain energised low voltage (LV) underground polymeric cables in the electricity supply industry (ESI).

It includes jointing and terminating energised cables using a range of specialised live working equipment, tools and devices, issuing and/or accepting electrical access permits and/or relevant working documentation, and undertaking authorised cable testing procedures.

It also includes the pre-commissioning and/or re-commissioning tests and updating system data/maintenance records.

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 work 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

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

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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 joint and maintain energised LV underground polymeric cables	**1.1** 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 the jointing and maintenance of energised LV underground polymeric cables 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 WHS/OHS and environmental hazards are identified, risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed in accordance with workplace procedures

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	1.7	Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8	Specialist equipment for live working is inspected and confirmed in working order as per requirements and established procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.10	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out jointing and maintenance of energised LV underground polymeric cables	**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	Jointing and maintenance of energised LV underground polymeric cables is completed safely, in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Cables are prepared for jointing, terminating or maintaining in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.5	Authorised cable testing procedures and fault identification and location processes are implemented in accordance with requirements and workplace procedures
	2.6	Maintenance, including repair and/or replacement of energised LV underground polymeric cables is carried out in accordance with work schedule, requirements and workplace procedures
	2.7	Cables are jointed, terminated or maintained in accordance with construction drawings, manufacturer instructions and workplace procedures
	2.8	Unplanned events are responded to in accordance with workplace procedures

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	2.9	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete jointing and maintenance of energised LV underground polymeric cables	**3.1**	Completed work is checked against work plan, 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 are, where appropriate cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are signed off and LV underground polymeric cables are 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 UETTDRCJ28A Joint and maintain energised low voltage underground polymeric cables.

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 UETTDRCJ28 Joint and maintain energised low voltage underground polymeric cables

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
- jointing and maintaining all of the following:
  - low voltage (LV) polymeric cables
- performing at least two (2) of the following cable joints:
  - tee-off joints
  - straight through joints
  - parallel branch joints
  - parallel joints
- installing at least one (1) of the following:
  - transformers
  - LV switchboards
  - pillars/turrets
  - lighting columns
  - ring main units
  - chamber substations
- installing at least one (1) of the following:
  - busbar/termination boxes
  - links/fuses
  - termination boxes
  - control gear
- using at least one (1) of the following:
  - resin filled boxes
  - polymeric tape
  - heat shrink

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  - ‘slip-on’ moulds
  - pre-stretched polymeric
- using at least two (2) of the following cable conductor connection methods:
  - compression joints/lugs
  - insulation piercing connectors
  - mechanical connectors
- using all of the following:
  - voltage detecting instruments
  - insulation resistance testers
  - cable identification equipment
  - phase rotation instruments
  - specialised live working equipment/tools
- using all of the following:
  - temporary earth bonding/bridging
  - insulating covers/matting
  - insulating tooling/gloves
- 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:

- 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 encompassing:
  - 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 polymeric cables encompassing:
  - 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 polymeric 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

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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 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 jointing and maintaining energised LV underground polymeric cables
- 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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UETTDRCJ29 Install gas and oil filled specialised underground cables

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 installation, jointing and termination of oil and gas filled specialised underground cables from 33 kV and higher. It includes the laying of the specialised underground ground cable, the preparation of the cables and phasing out jointing and terminating and the preparation of the cable jointing bay. It also encompasses the relevant safety procedures to ensure installation of the specialised cable is undertaken according to established enterprise requirements.

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

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

UETTDRCJ21 Lay ESI electrical cables

UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables

UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables

UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables

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UETTDRCJ99 Test and verify distribution cable jointing installations

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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/plan to install oil and gas filled specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.4 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks

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		assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the installation of oil and gas filled specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and

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practices are safely exercised according to requirements

2.4 Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures

2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures

2.6 Installation of oil and gas filled specialised underground cables is carried out in accordance with the work schedule and requirements and/or established procedures

2.7 Essential knowledge and associated skills are applied in the safe installation of oil and gas filled specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements

2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements

2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard

3 Complete the installation of oil and gas filled specialised underground cables

3.1 Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures

3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures

3.3 Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permit(s) are signed off and underground cables are returned to service and advised to

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client/customer in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawing(s) and/or documentation and information are confirmed, processed and appropriate 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 UETTDRCJ29A Install gas and oil filled specialised underground cables.

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 UETTDRCJ29 Install gas and oil filled specialised underground cables

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
- installing the following pressurised 33 kV and above cable types:
  - oil filled cables
  - gas filled cables
- using all of the following equipment:
  - specialised cable installation equipment
  - winches
  - caterpillars
  - rollers
  - bond lines
  - drum jacks
  - cable end caps/nose pull assemblies
- performing at least two (2) of the following jointing methods:
  - straight through joint
  - straight stop joint
  - trifurcating joint
  - splitter joint
  - trifurcating/transition/stop
- performing at least one (1) of the following termination methods:
  - box termination
  - gas filled termination
  - compound filled termination
- performing at least two (2) of the following connectors:
  - welded connectors

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  - mechanical connectors
  - compression connectors
- 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:

- oil and gas filled specialised underground cable principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with oil or gas filled specialised underground cables
  - types of oil or gas filled specialised underground cables - properties of paper insulation, oil and nitrogen gas, construction, reasons for gas and/or oil filled, characteristics and capabilities of the cable, and pressure/volume characteristics of oil and gas
  - precautions when handling
  - types and functions of tools and equipment used on oil or gas filled specialised underground cables
  - techniques when handling, storing and disposing of oil or gas filled specialised underground cables
- installation of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation of oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE), including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the installation of oil or gas filled specialised underground cables
  - techniques in the safe installation of oil or gas filled specialised underground cables
  - techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful installation has occurred
- jointing and terminating oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to jointing and terminating oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work

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systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
    - types, function and serviceability of tools and equipment used for the jointing and terminating of oil or gas filled specialised underground cables
    - techniques in the safe jointing and terminating oil or gas filled specialised underground cables
    - techniques in the safe testing of the oil or gas filled specialised underground cables to ensure successful jointing and/or termination has occurred
- enterprise-specific policies and procedure instructions encompassing:
    - 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 well-being, 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 encompassing:
    - 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 encompassing:
    - 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.

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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 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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UETTDRCJ30 Maintain gas and oil filled specialised underground cables

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 maintenance and repair of oil and gas filled specialised underground cables 33 kV and above. It includes testing, diagnosing faults, repairing and replacing the specialised cables. It also encompasses the processes for preliminary pressure control and leak repair, as well as working under induced voltages, cable identification and cable freezing.

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

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

UETTDRCJ21 Lay ESI electrical cables

UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables

UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables

UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables

UETTDRCJ29 Install gas and oil filled specialised underground cables

UETTDRCJ99 Test and verify distribution cable jointing installations

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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/plan to maintain oil and gas filled specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented

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		and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the maintenance of oil and gas filled specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements

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	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Maintenance of oil and gas filled specialised underground cables is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe maintenance of oil and gas filled specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance of oil and gas filled specialised underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and underground cables are returned to service and advised to client/customer in accordance with requirements

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3.6 Works completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRCJ30A Maintain gas and oil filled specialised underground cables.

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 UETTDRCJ30 Maintain gas and oil filled specialised underground cables

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
- installing all of the following pressurised 33 kV and above cable types:
  - oil filled cables
  - gas filled cables
- performing at least two (2) of the following jointing methods:
  - straight through joint
  - straight stop joint
  - trifurcating joint
  - splitter joint
  - trifurcating/transition/stop joint
- performing at least one (1) of the following termination methods:
  - air box terminator
  - gas filled terminator
  - compound filled terminator
- connecting cable conductors using at least two (2) of the following:
  - welded connectors
  - mechanical connectors
  - compression connectors
- using specialist testing devices including all of the following:
  - voltage detectors
  - cable identification equipment and spiking
  - insulation resistance testers
- using/applying all of the following equipment and materials:
  - leak repair and pressure control cable freezing equipment

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  - pressure control tapes
  - fittings and seals
- undertaking preparation for cable freezing, preliminary pressure control and leak repair activities
- using cable terminating materials including at least two of the following:
  - paper tape
  - polymeric tape
  - heat shrink
  - slip-on moulds
- 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 pertaining to the maintenance of oil or gas filled specialised underground cables
- safety precautions of working with oil or gas filled specialised underground cables encompassing:
  - safe operation procedures
  - WHS/OHS hazards and precautions
  - dangers of working in confined spaces
  - identification of WHS/OHS hazards, and assessing and controlling risks
  - types, selection, maintenance, storage and uses of personnel protective equipment (PPE), including intrinsically safe equipment for use in confined and hazardous environments
  - permit/authorisation to work systems and isolation procedures
  - safe working policies, procedures and practices when using/operating specialised equipment
  - emergency response and rescue, including first aid
- safe storage and disposal of oil or gas filled specialised underground cables and associated equipment and components; types, function and serviceability of tools and equipment used for the maintenance of oil or gas filled specialised underground cables; and techniques in the safe maintenance of oil or gas filled specialised underground cables
- techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful maintenance has occurred.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must 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 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
- 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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UETTDRCJ31 Install and maintain polymeric specialised underground cables

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 installation, maintenance and repair of polymeric specialised underground cables, including cross-linked polyethylene (XLPE) and ethylene propylene rubber (EPR) above 33 kV. It includes jointing and terminating, as well as working under induced voltages and undertaking the relevant tests required for jointing. It also encompasses the preparation of the cable jointing bay, the preparation of cables and phasing out, cable identification and spiking, and the treatment/handling of, but not jointing fibre optical cables.

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

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

UETTDRCJ21 Lay ESI electrical cables

UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables

UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables

UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables

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UETTDRCJ99 Test and verify distribution cable jointing installations

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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/plan to install and maintain polymeric specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established

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		procedures
	1.5	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the installation and maintenance of polymeric specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and

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		practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Installation and\or maintenance of polymeric specialised underground cables is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe installation and/or maintenance of polymeric specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the installation and maintenance of polymeric specialised underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and underground cables are returned to service and advised to

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client/customer in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRCJ31A Install and maintain polymeric specialised underground cables.

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 UETTDRCJ31 Install and maintain polymeric specialised underground cables

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
- installing and maintaining at least one (1) of the following specialised 33 kV and above cable types:
  - cross-linked polyethylene (XLPE) cables
  - ethylene propylene rubber (EPR) cables
- undertaking jointing and terminating including all of the following:
  - straight through joints
  - terminations
- using at least three (3) of the following specialised cable installation equipment:
  - winches
  - caterpillars
  - rollers
  - bond lines
  - nose pull devices
  - drum jacks
- connecting cable conductors using at least two (2) of the following:
  - compression lugs
  - welded connections
  - mechanical connectors
- using cable terminating materials including at least two (2) of the following:
  - compound and resin filled boxes
  - air boxes
  - gas filled boxes
  - polymeric tape
  - polymeric heat shrink

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  - slip-on moulds
  - pre-stretched polymeric materials
- 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:

- polymeric specialised underground cables principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with polymeric specialised underground cables
  - types of polymeric specialised underground cables – construction, characteristics and capabilities of the polymeric specialised cable, pressure/volume characteristics of oil and gas, and precautions when handling
  - types and functions of tools and equipment used on polymeric specialised underground cables
  - techniques when handling polymeric specialised underground cables
- installation and maintenance of polymeric specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of polymeric specialised underground cables
  - safety precautions of working with polymeric specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the installation of polymeric specialised underground cables
  - techniques in the safe installation of polymeric specialised underground cables
  - techniques in the safe maintenance of polymeric specialised underground cables
  - techniques in the safe testing/inspection of the polymeric specialised underground cables to ensure successful installation and/or maintenance has occurred
- jointing and termination of polymeric specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with polymeric specialised underground cables
  - safety precautions of working with polymeric specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue including,

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first aid
    - types, function and serviceability of tools and equipment used for the jointing and terminating of polymeric specialised underground cables
    - techniques in the safe jointing and terminating polymeric specialised underground cables
    - techniques in the safe testing of the polymeric specialised underground cables to ensure successful jointing and/or termination has occurred
- enterprise-specific policies and procedure instructions encompassing:
    - 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 - firefighting procedures, fatigue management, training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
    - 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 encompassing:
    - 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.

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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 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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UETTDRCJ32 Install and maintain gas and oil pressure systems for specialised underground cables

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 installation, maintenance and repair of oil and gas pressure systems for specialised underground cables. It includes the undertaking of pressure control activities, the installation of gauges, oil tanks and gas cubicles. It also includes knowledge of oil route profiles as well as the operation of pressure equipment for jointing works, and the repairing and replacing of pressure systems. It also encompasses the procedures associated with performing accessory impregnation, oil flow testing, the processes for oil degasification and performing leak location of pressure systems.

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

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

UETTDRCJ21 Lay ESI electrical cables

UETTDRCJ23 Install and maintain de-energised high voltage underground paper insulated cables

UETTDRCJ26 Install and maintain de-energised low voltage underground polymeric cables

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UETTDRCJ27 Install and maintain de-energised high voltage underground polymeric cables

UETTDRCJ99 Test and verify distribution cable jointing installations

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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/plan to install and maintain oil and gas pressure systems for specialised underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained, analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

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	1.5	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the installation and maintenance of oil and gas pressure systems for specialised underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures

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	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Installation and/or maintenance of oil and gas pressure systems for specialised underground cables are carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe installation and/or maintenance of oil and gas pressure systems for specialised underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the installation and maintenance of oil and gas pressure systems for specialised underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and

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returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and underground cables are returned to service and advised to client/customer in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRCJ32A Install and maintain gas and oil pressure systems for specialised underground cables.

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 UETTDRCJ32 Install and maintain gas and oil pressure systems for specialised underground cables

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
- installing and maintaining oil and gas filled pressure systems
- using all of the following oil and gas processing and control equipment:
  - gas analyser/detector
  - cable freezing equipment
  - accessory impregnation equipment
  - oil degasification plant
  - manometers
  - flow boards
  - vacuum pumps
  - site bottles
  - gas cylinders
  - liquid nitrogen cylinders
  - pressure/vacuum meters
  - oil evacuation pumps
  - oil and gas piping equipment
  - oil sampling equipment
- using all of the following gas processing and control equipment:
  - gas control cubicles
  - oil control cubicles
  - oil degasification units
  - oil pressure tanks
- undertaking jointing and terminating of oil or gas filled specialised underground cables
- 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:

- oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the working with oil or gas filled specialised underground cables
  - types of oil or gas filled specialised underground cables - properties of paper insulation, oil and nitrogen gas, construction, reasons for gas and/or oil filled, characteristics and capabilities of the cable, pressure/volume characteristics of oil and gas, and precautions when handling
  - types and functions of tools and equipment used on oil or gas filled specialised underground cables
  - techniques when handling, storing and disposing of oil or gas filled specialised underground cables
- installation of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation of oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE),including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the installation of oil or gas filled specialised underground cables
  - techniques in the safe installation of oil or gas filled specialised underground cables
  - techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful installation has occurred
- jointing and termination of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to working with oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - types, function and serviceability of tools and equipment used for the jointing and terminating of oil or gas filled specialised underground cables

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  - techniques in the safe jointing and terminating oil or gas filled specialised underground cables
  - techniques in the safe testing of the oil or gas filled specialised underground cables to ensure successful jointing and/or termination has occurred
- maintenance of oil or gas filled specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the maintenance of oil or gas filled specialised underground cables
  - safety precautions of working with oil or gas filled specialised underground cables - safe operation procedures; WHS/OHS hazards and precautions; dangers of working in confined spaces; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, including intrinsically safe equipment for use in confined and hazardous environments; permit/authorisation to work systems and isolation procedures; safe working policies, procedures and practices when using/operating specialised equipment; and emergency response and rescue, including first aid
  - safe storage and disposal of oil or gas filled specialised underground cables and associated equipment and components;
  - types, function and serviceability of tools and equipment used for the maintenance of oil or gas filled specialised underground cables
  - techniques in the safe maintenance of oil or gas filled specialised underground cables
  - techniques in the safe testing/inspection of the oil or gas filled specialised underground cables to ensure successful maintenance has occurred
- oil and gas pressurised systems for specialised underground cables encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of oil and gas pressurised systems
  - safe storage and disposal of oil or gas pressurised equipment and associated components
  - requirements for the use of manuals, system diagrams/plans, drawings, charts and layouts
  - characteristics, application and care of hand and specialised tools
  - techniques in determining route profiles and access locations
  - pressure system characteristics for oil filled and gas filled cables
  - techniques in the safe installation of oil and gas pressurised systems
  - techniques in the safe maintenance of oil and gas pressurised systems
  - techniques in the safe use of tools and equipment in the process of installation and maintenance of oil and gas pressurised systems - gas analyser/detector, manometers, flow boards, cable freezing equipment, accessory impregnation equipment, oil degasification plant, manometers, flow boards, vacuum pumps, site bottles, gas cylinders, pressure/vacuum meters, oil evacuation pumps, RGP equipment, oil sampling equipment, gas control cubicles, oil control cubicles, cable joints and terminations, oil degasification units and oil pressure tanks
- enterprise-specific policies and procedure instructions encompassing:
  - 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

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  - 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 encompassing:
  - 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 encompassing:
  - 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, facilities, 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

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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UETTDRCJ33 Install and maintain network infrastructure LV underground cables

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 installation and maintenance of de-energised low voltage (LV) underground cables and covers the laying of cables as well as the jointing, terminating, repair and replacement of cables. It also includes direct laying of cables in trenches, on racks, in troughs and/or in conduit or ducts; and the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or recommissioning tests and the updating of system data/maintenance records.

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS46 Install and maintain ESI network infrastructure electrical equipment

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Cable Jointing

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 the laying, installation and maintenance of underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and

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		identified for all worksites
	1.3	Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the laying, installing and maintenance of LV underground cables are obtained and confirmed for the purposes of the work to be performed and communicated
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8	Relevant personnel at worksite are confirmed current in first aid and other related work procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
	1.12	Road signs, barriers and warning devices are positioned in accordance with requirements
2 Carry out the laying, installation and maintenance of LV	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in

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underground cables		accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and working aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied for the safe installation and maintenance of LV underground cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Electrical cables are laid in accordance with the work schedule and requirements/established procedures
	2.6	De-energised LV underground cables are installed according to the work schedule and requirements/established procedures
	2.7	Maintenance, including repair and/or replacement of de-energised LV underground cables, is carried out in accordance with the work schedule and requirements/established procedures
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.9	Unplanned events in the laying, installing and carrying out the maintenance of LV underground cables are undertaken within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the laying, installation and maintenance of LV underground cables	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures

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3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and LV underground cables are returned to service in accordance with requirements

3.6 Works completion records, reports, drawings and/or documentation and information are finalised and processed, and appropriate 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 UETTDRCJ33A Install and maintain network infrastructure LV underground cables.

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 UETTDRCJ33 Install and maintain network infrastructure LV underground cables

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
- laying at least one (1) of the following low voltage (LV) cable types:
  - LV polymeric
  - LV paper insulated
- laying LV cables using at least one (1) of the following installation types:
  - direct lay
  - on racks
  - in conduits
- laying LV cables using at least one (1) of the following cable pulling methods:
  - stocking pulling
  - bond pulling
  - armour pulling
  - nose pull attachments
- sealing LV cables using at least two (2) of the following cable sealing methods:
  - heat shrinkable
  - pre-stretched materials
  - tin/lead wiping
  - pre-moulded components
- cutting LV cables using at least one (1) of the following cable cutting methods:
  - hydraulic cutters
  - electric reciprocating
  - motorised
  - hand tools
- laying LV cables using at least four (4) of the following supporting plant and equipment:

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    - drum jacks
    - winches
    - spindles
    - capstans
    - bollards
    - cable trailers
    - rollers
    - lubricants
    - ropes
    - bell mouths
    - draw wires/rods
- joining LV cables using at least two (2) of the following jointing methods:
    - tee-off joints
    - straight through joints
    - parallel branch joints
    - parallel joints
- terminating LV cables in/on at least two (2) of the following locations:
    - transformers
    - LV switchboards
    - pillars/turrets
    - lighting columns
    - ring main units
    - chamber substations
- terminating LV cables using at least two (2) of the following types of equipment:
    - busbar/termination boxes
    - links/fuses
    - disconnect boxes
    - termination boxes
    - control gear
    - underground/overhead terminations
    - circuit breakers
- jointing and terminating LV cables using at least one (1) of the following material types:
    - resin filled boxes
    - compound filled boxes
    - polymeric tape
    - heat shrink
    - 'slip-on’ moulds
    - pre-stretched polymeric
- terminating LV cables using at least one (1) of the following connectors:

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  - compression lugs
  - welded connections
  - mechanical connectors
  - insulation piercing connectors
- testing LV cables using all of the following testing and recording equipment:
  - insulation resistance testers
  - voltage detectors
- 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:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the HV equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of high voltage (HV) equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers; operation under load/no-load conditions; types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- powerline safety practices encompassing:
  - 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

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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 procedures 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 procedure 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; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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
- procedures in providing store support encompassing:
  - classification and identification of equipment, components and tools
  - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
  - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks and forklifts
  - cable drum handling equipment
  - safety procedures - storage and care of safety equipment; handling hazardous materials; storage of hazardous substances and dangerous goods; depot safety procedures; manufacturer and supplier information, including material safety data sheets (MSDS)
- installation of underground cable encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment (PPE), hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures
  - trench excavation and reinstatement procedures
  - installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried,

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ducts cleated and racked)
    - procedures for the safe use of LPG equipment for cable jointing
- LV polymeric cable jointing principles encompassing:
    - techniques in jointing LV cross-linked polyethylene (XLPE) cables - straight through joint, jointing different types of cable and service and street light cable joints
    - techniques in terminating LV XLPE - pole top terminations, substation terminations, distribution pillar /column/cubicle terminations and service and street light cable terminations
    - techniques in repairing LV XLPE cable - different types of damage, repairs to sheath and repairs to cores
    - methods of testing cable after jointing
- jointing and termination of LV polymeric cable encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of LV polymeric cables
    - types of cables - single core, multi-core and XLPE insulation
    - methods of cable handling - direct laid cables, duct laid cables, solid laid cables and cables supported in cleats or hangers
    - corrosion protection
    - minimum bending radius of cables
    - methods of cable sealing - shorting of cables cores and core of un-terminated cables
    - methods of protection from corrosion
    - polymeric sheathed cables sealing with mastic lined
    - heat shrink caps buried sealed ends
    - types of jointing tools - general hand tools and compression tools
    - techniques in the use of LPG - safety precautions, PPE, general maintenance and repair
    - safety precautions when cable jointing -working in confined spaces; permit to work systems and isolation procedures; and emergency rescue/response, including first aid
- underground cables construction and types encompassing:
    - safety precautions specific to handling underground cables
    - requirements for the use of enterprise manuals, system diagrams/plans and drawings
    - types and applications of underground cables
    - construction types and structures of underground cables
    - characteristics of different types of underground cables
    - ratings.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must 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 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
- 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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UETTDRCJ34 Install and maintain network infrastructure HV underground cables

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 installation and maintenance of de-energised high voltage (HV) underground cables and covers the laying of cables as well as the jointing, terminating, repair and replacement of cables. It includes direct laying of cables in trenches, on racks, in troughs and/or in conduit or ducts, and the isolation of systems and circuits, the procedure of issuing/accepting electrical access permits, the undertaking of pre-commissioning and/or recommissioning tests and the updating of system data/maintenance records.

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UETTDRCJ33 Install and maintain network infrastructure LV underground cables

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS46 Install and maintain ESI network infrastructure electrical equipment

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Cable Jointing

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 the laying, installation and maintenance of de-energised HV underground cables	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection

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1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the laying, installing and maintenance of HV underground cables are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel

1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures

1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order

1.8 Relevant personnel at worksite are confirmed current in first aid and other related work procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work, where necessary

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures

1.12 Road signs, barriers and warning devices are positioned in accordance with requirements

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2 Carry out the laying, installation and maintenance of HV underground cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and, currency according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of HV underground polymeric cables to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Electrical cables are laid in accordance with the work schedule and requirements/established procedures
	2.6	De-energised HV underground cables are installed according to the work schedule and requirements/established procedures
	2.7	Maintenance, including repair and/or replacement of de-energised HV underground cables, is carried out in accordance with the work schedule and requirements/established procedures
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.9	Unplanned events in the installation and maintenance of HV underground cables are undertaken within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the laying,	**3.1**	Work undertaken is checked against work schedule for

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installation and maintenance of HV underground cables		conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and HV underground cables are returned to service in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate 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 UETTDRCJ34A Install and maintain network infrastructure HV underground cables.

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 UETTDRCJ34 Install and maintain network infrastructure HV underground cables

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
- laying at least one (1) of the following cable types:
  - high voltage (HV) polymeric
  - HV paper insulated
- laying HV cables using at least one (1) of the following installation methods:
  - direct lay
  - on racks
  - in conduits
- laying HV cables using at least one (1) cable pulling method of the following:
  - stocking pulling
  - bond pulling
  - armour pulling
  - nose pull attachments
- sealing HV cables using at least two (2) of the following cable sealing methods:
  - heat shrinkable
  - pre-stretched materials
  - tin/lead wiping
  - pre-moulded components
- cutting HV cables using at least one (1) of the following cable cutting methods:
  - hydraulic cutters
  - electric reciprocating
  - motorised
  - hand tools
- laying HV cables using at least four (4) of the following supporting plant and equipment:

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  - drum jacks
  - winches
  - spindles
  - capstans
  - bollards
  - cable trailers
  - rollers
  - lubricants
  - ropes
  - bell mouths
  - draw wires/rods
- joining HV cables using at least two (2) of the following jointing methods:
  - tee-off joints
  - straight through joint
  - parallel branch joint
  - parallel joint
- incorporating at least one (1) of the following:
  - transformers
  - ring main units
  - chamber substations
- incorporating at least one (1) of the following:
  - busbar/termination boxes
  - links/Fuses
  - termination boxes
  - control gear
  - circuit breakers
- jointing and terminating HV cables using at least two (2) of the following material types:
  - resin filled boxes
  - compound filled boxes
  - polymeric tape
  - heat shrink
  - ‘slip-on’ moulds
  - pre-stretched polymeric
- testing HV cables using all the following testing and recording equipment:
  - insulation resistance testers
  - voltage detectors
- incorporating all the following:
  - cable identification devices
  - cable spiking devices

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- incorporating at least two (2) of the following:
  - mechanical connectors
  - compression connectors
  - lugs
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of HV underground polymeric cables
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings encompassing:
  - characteristics of different types of cables and components
  - purpose of stress control
  - applications of various tools and equipment for HV jointing
- procedure for isolating HV underground cables encompassing:
  - method for proving safe to work
  - earthing procedures
- techniques in jointing HV underground polymeric cable encompassing:
  - short circuit cores and seal cable
  - straight through
  - trifurcating
- techniques in HV terminations encompassing:
  - pole top termination
  - substation/switchgear termination
  - ABC termination
  - telcon termination
- procedures for repairing HV underground cables encompassing:
  - location of faults
  - types of damage
  - techniques to repairs to sheath
  - techniques to repairs to core.

Assessment Conditions

Assessors must hold credentials specified within the Standards 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 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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UETTDRCJ99 Test and verify distribution cable jointing installations

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 test and verify distribution cable jointing installations in the electricity supply industry (ESI).

It includes the installation and maintenance of de-energised high voltage (HV) and low voltage (LV) underground polymeric cables including underground services, network infrastructure and jointing, terminating and repairing cables. It also includes working safely, conducting visual inspections and mandatory and functional test procedures, identifying non-compliance defects and completing mandatory reporting requirements

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Cable Jointing

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 test and verify underground distribution cable installation	**1.1** 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 the installation of electrical equipment (network infrastructure) 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 WHS/OHS and environmental hazards are identified, WHS/OHS risks are assessed and control measures identified in accordance with workplace procedures following consultation with relevant personnel
	1.6 Relevant work permits are confirmed and signed in accordance with workplace procedures

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	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 jointing LV and HV underground polymeric cables and LV services	**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	Systems and circuits are isolated as required, proved safe to work on in accordance with workplace procedures
	2.4	Inspection, testing and verification of LV and HV underground polymeric cables is completed safely, in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.5	LV and HV underground polymeric cables and associated equipment are installed and terminated/connected in accordance with work schedule, requirements and workplace procedures
	2.6	Maintenance, including repair and/or replacement of LV and HV underground polymeric cables is carried out in accordance with work schedule, requirements and workplace procedures
	2.7	Underground cable installations and associated hardware are visually inspected and confirmed as positioned, secured and terminated/connected in accordance with requirements and workplace procedures
	2.8	Tests and/or measurements to verify cable jointing installations are determined and conducted in accordance with WHS/OHS requirements and workplace safety procedures

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	2.9	Unplanned events are responded to in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance with instructions and workplace procedures
3 Complete jointing LV and HV underground polymeric cables and LV services	**3.1**	Completed work is checked against work plan, 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 are, where appropriate, are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are signed off and cables are 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 UETTDRCJ99A Test and verify distribution cable jointing installations.

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Assessment Requirements for UETTDRCJ99 Test and verify distribution cable jointing installations

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
- testing and verifying all of the following:
  - low voltage (LV) polymeric cables
  - high voltage (HV) polymeric cables
- using at least two (2) of the following:
  - tee-off joints
  - straight through joints
  - parallel branch joints
  - parallel joints
  - trifurcating joint
- using at least two (2) of the following:
  - pillars (single phase)
  - pillars (three phase)
  - lighting pillar standards
  - LV switchboards
  - substations
  - underground/overhead terminations
- using at least one (1) of the following:
  - transformers
  - switchgear
  - ring main units
- using at least one (1) of the following cable sealing methods:
  - resin filled boxes
  - compound filled boxes

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  - polymeric tape
  - heat shrink
  - 'slip-on' moulds
- using at least one (1) of the following cable conductor connection methods:
  - compression lugs
  - mechanical connectors
  - insulation piercing connectors
  - lugs
- performing at least four (4) of the following cable tests:
  - polarity test*
  - phase rotation test
  - continuity test
  - voltage test
  - insulation resistance test
  - (*must do)
- using all of the following:
  - cable ID devices
  - cable spiking 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:

- legislated regulations encompassing:
  - legislation and regulations that require distribution cable jointing installations and equipment to be tested to ensure they are safe
  - the person/bodies responsible for the various aspects of ensuring distribution cable jointing installations are safe
  - results of tests that show a distribution cable jointing installation is safe for connection to the supply
  - results of periodic inspection and tests that show wiring and equipment is safe to use
  - results of periodic inspection and tests that show the distribution cable jointing installations electrical equipment is safe to use
- testing installations encompassing:
  - distribution cable jointing system phasing, phase rotation and polarity is correct and conforms to network construction standards
  - installation resistance is adequate
  - cable identification
- documentation encompassing:
  - results of tests conducted on a distribution cable jointing installation in accordance with work package requirements and to ensure the distribution cable jointing installation is

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safe
    - documents of periodic inspection and testing of distribution cable jointing installation and equipment in accordance with requirements
- techniques in the installation and maintenance of network infrastructure
- techniques in jointing, terminating and maintenance encompassing:
    - HV polymeric cables
    - LV polymeric cables
    - underground services.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 testing and verifying distribution cable jointing installations
- 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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UETTDRDP11 Inspect overhead poles-structures and electrical 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 involves the skills and knowledge required to inspect overhead poles-structures and electrical apparatus in the electricity supply industry (ESI).

It includes inspection of overhead conductors and/or cables, underground and overhead transition points, pole-mounted transformers, switchgear, hardware and/or earthing systems. It also includes the completion of inspection reports and other relevant documentation.

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Distribution

Unit Sector

Not applicable.

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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 inspect overhead structures and electrical apparatus used on poles-structures	**1.1** 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 the inspection of overhead structures and electrical apparatus used on poles and/or structures are obtained and confirmed for the purposes of the work to be performed and communicated
	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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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 Inspecting overhead structures and electrical apparatus used on poles-structures	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace procedures

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	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 Inspection of overhead poles-structures and electrical apparatus is completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4 Inspection of overhead structures and electrical apparatus is performed in accordance with job schedules, work requirements and workplace procedures
	2.5 Unplanned events in the inspection of overhead poles-structures and electrical apparatus are responded to in accordance with workplace procedures
	2.6 Quality checks of work are undertaken in accordance with workplace procedures
3 Complete inspection of overhead structures and electrical apparatus used on poles-structures	**3.1** Completed work is checked against work plan, 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 and overhead structures and electrical apparatus used on poles-structures are 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

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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 UETTDRDP11A Inspect overhead poles-structures and electrical 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 UETTDRDP11 Inspect overhead poles-structures and electrical 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
- inspecting any three (3) of the following items on each occasion:
  - poles and structures
  - overhead conductors/cables
  - underground/overhead transition points
  - electrical equipment
  - hardware
  - earthing systems
- undertaking inspections using at least one (1) of the following:
  - ground
  - vehicle
  - helicopter
  - fixed wing
- undertaking inspections using at least two (2) of the following inspection methods:
  - visual*
  - infra-red camera
  - X-ray
  - camera
  - (*must Do)
- 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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- standards, codes, legislation, supply authority regulations and/or enterprise requirements
- characteristics of wood used for structures within the electrical distribution system encompassing:
  - relationship between timber and water
  - faults that occur that influence the integrity of the structure
  - effects of fungal activity
  - effects of termite and borer activity
  - effects of dry rot
- deterioration of assets encompassing:
  - relationship between steel, concrete and wood
  - deterioration in steel and concrete
  - inspection procedures for deterioration
- overhead line inspection procedures of electrical distribution structures encompassing:
  - methods and requirements for overhead line inspection on electrical distribution structures
  - clearances for overhead conductors, cables and structures
  - use of specific equipment during inspection
  - methods of recording data
- underground cable inspection procedures in the electrical distribution system encompassing:
  - state/territory and industry policies and regulations
  - methods and requirements for inspection of underground cable 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 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 inspecting overhead poles-structures and electrical apparatus
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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UETTDRDP12 Maintain overhead energised low voltage conductors and cables

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 overhead energised low voltage (LV) conductors and cables in the electricity supply industry (ESI).

It includes verification of site conditions and potential hazards, selecting appropriate and authorised work methods using specialised equipment and the diagnosis of faults. It also includes undertaking electrical tests and updating system data/maintenance records.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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Competency Field

Distribution

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 maintenance of overhead energised LV conductors and cables	**1.1** Work plan, construction plans, drawings, workplace procedures and material lists are received, confirmed and communicated with relevant personnel
	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 the maintenance of overhead energised LV conductors and cables are obtained and confirmed for the purposes of the work to be performed
	1.4 Physical loads and calculations are confirmed in accordance with workplace procedures
	1.5 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.6 Hazards are identified, WHS/OHS risks assessed and control measures identified in accordance with workplace procedures
	1.7 Relevant work permits are obtained, understood and signed in accordance with workplace procedures
	1.8 Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order

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	1.9	Specialist equipment for live work is inspected and confirmed in working order in accordance with workplace procedures
	1.10	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Conduct maintenance of overhead energised LV conductors and cables	**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	Overhead energised LV conductors and cables are maintained in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Maintenance, repair and/or replacement of poles and/or structures is performed in accordance with job schedule, work requirements and workplace procedures
	2.5	Unplanned events in the maintenance of overhead energised LV conductors and cab are responded to in accordance with workplace procedures
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete maintenance of overhead energised LV conductors and cables	**3.1**	Completed work is checked against work plan, 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 are, where appropriate, cleaned, checked and returned to storage in

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accordance with workplace procedures

3.5 Relevant work permits are signed off and overhead energised LV conductors and cables are 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 UETTDRDP12A Maintain overhead energised low voltage conductors and cables.

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 UETTDRDP12 Maintain overhead energised low voltage conductors and cables

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 energised overhead low voltage (LV) conductors and cables on at least two (2) of the following:
  - copper
  - aluminium
  - aluminium/steel reinforced
  - steel
  - pilot
- performing work on energised overhead LV conductors and cables from at least two (2) of the following:
  - elevated work platform (EWP)
  - ladder
  - portable platform
- using specialist live working equipment, including all of the following:
  - insulating mats/sleeves
  - temporary bridging device
  - insulating gloves
  - insulated cable tensioning devices
  - ladder/pole shrouds
  - equipotential bonding
- using specialist testing equipment, including at least three (3) of the following:
  - voltage detector*
  - clamp-on ammeter
  - polarity tester
  - insulation resistance tester

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  - phase sequence indicator
  - recording meters
  - (*must do)
- 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:

- 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, including:
  - 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, including:
  - types and function of specialised tools
  - safe working practices when using specialised tools
  - methods of using specialised 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 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 maintaining overhead energised LV conductors and cables
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals

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UETTDRDP13 Maintain energised HV distribution overhead electrical apparatus (stick)

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 energised high voltage (HV) distribution overhead electrical apparatus using the stick method in the electricity supply industry (ESI).

It includes maintaining electrical apparatus using HV live line sticks, verifying site conditions and potential hazards, confirming and calculating physical loads and selecting appropriate authorised work methods.

It also includes preparing and cleaning specialist material and tools in accordance with authorised technical instructions; undertaking legislative and safe working practices; rendering inoperative automatic re-closing devices, including its restoration in accordance with the work plan; and issuing/accepting electrical access permits and/or relevant working documents.

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 one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Distribution Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

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

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UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

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

UETTDREL16 Working safely near live electrical apparatus

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

UETTDRIS65 Contribute to coordinated HV live working

Competency Field

Distribution

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 energised HV distribution overhead electrical apparatus (stick)	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.3 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.4 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented

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		and monitored in accordance with workplace procedures
	1.5	Relevant work permits are obtained and signed in accordance with workplace procedures
	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 perform work, as required
	1.8	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.9	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.10	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out maintenance of energised HV distribution overhead electrical apparatus (stick)	**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	Emergency response procedures are performed in accordance with job requirements and/or workplace procedures
	2.3	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Auto-reclose devices and associated circuits are rendered inoperative and necessary work documentation obtained 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	Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures

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	2.7	Maintenance of energised HV overhead electrical apparatus is performed in accordance with works schedules, job requirements and workplace procedures
	2.8	Energised HV overhead electrical apparatus are safely installed and maintained in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.9	Solutions to unplanned events/problems are identified and actioned in accordance with workplace procedures and approval of authorised personnel
	2.10	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete maintenance of energised HV distribution overhead electrical apparatus (stick)	**3.1**	Completed work is checked against works 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 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	Relevant work permits are signed off and energised HV apparatus 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.

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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 UETTDRDP13A Maintain energised HV distribution overhead electrical apparatus (stick).

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 UETTDRDP13 Maintain energised HV distribution overhead electrical apparatus (stick)

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
- completing all of the following:
  - installing/replacing structures
  - installing/replacing hardware (e.g. cross-arm and insulator)
  - repairing conductors
  - installing/replacing/connecting bridge/bonding connections
- completing at least two (2) of the following:
  - installing/replacing pole mounted reclosers
  - installing/repairing/replacing air brake switches
  - installing/repairing/replacing high voltage (HV) links/disconnects
  - installing/removing temporary HV links/HV fuses
  - washing insulators
  - installing/repairing/replacing expulsion drop-out fuses
  - installing/replacing lightning arrestors
  - installing/replacing vibration dampers or aircraft warning markers
- using at least two (2) of the following access equipment:
  - elevated work platform (EWP)
  - ladder
  - pole platform
  - insulated structure
- using at least one (1) of the following testing and recording devices:
  - voltage detector
  - leakage detector
  - insulation test equipment

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- 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 and regulations, including:
  - legislation, standards and codes
  - supply authority regulations
  - industry guidelines and enterprise requirements
- safety precautions for HV live work up to and including 132 kV (poles) utilising live HV stick method, including:
  - minimum approach distances
  - WHS/OHS hazard and precautions
  - assessing and controlling risks
  - effects of excessive conductor temperature on insulating equipment
  - personnel protective equipment (PPE)
  - integrity of insulation
  - emergency response, first aid and rescue
- policies and procedures for live HV stick method up to and including 132 kV, including:
  - policies, procedures and practices
  - definition of terms
  - responsibilities of personnel
  - types of structures
  - types of equipment and compliance
- stick techniques up to and including 132 kV, including:
  - HV insulators
  - HV crossarms
  - HV bridge connections
  - installation and maintenance of equipment
  - temporary midspan switching devices
  - erection and replacement of poles
  - replacement of conductors and cables
  - HV armour rods and line guards
  - conversion intermediate to strain construction
  - switching devices
- safety precautions for plant, equipment and tools, including:
  - safe working clearances
  - identification of WHS/OHS hazards
  - assessing and controlling risks and hazards

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    - PPE
- identification and serviceability of plant, equipment and tools, including:
    - identification of plant, equipment and tools
    - serviceability of plant equipment and tools
- operational use of plant, equipment and tools, including:
    - conductor supports
    - selecting conductor support method
    - calculation of loads
    - effects of secondary loading
    - effects of resultant forces
    - conductor support rigging procedures
- electrical and electrostatic principles, including:
    - relationship with current, voltage and resistance as related to distribution lines
    - phase voltage and respective line voltages
    - production of an electric field
- HV insulation including:
    - construction of insulators
    - checking integrity of insulation prior to work commencement
    - effects of electrical fields on insulators
    - number of disc insulators needed
    - performance of a failed insulator on the line and system
    - minimum number of discs per string
    - detecting failed insulators
- electrostatic induction on the human body, including effects
- switching surges and magnetic fields, including:
    - lightning and switching surges
    - magnetic fields
- HV switching fundamentals, including:
    - manuals system diagrams/plans and drawings
    - HV live work access authority/permit system
    - fault current protection devices
    - disabling auto-reclose function
    - network interconnectors
    - test instruments
    - types of switchgear
    - HV electrical faults
    - types
    - causes
    - effects
- HV single wire earth return (SWER) system, including:

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  - components
  - circuit arrangement
  - operation principles
  - faulty SWER earth system
- safety observer principles, including:
  - duties
  - techniques
  - minimum approach distances (MAD)
  - minimum safe working distance from vegetation
- teamwork HV 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 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, 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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UETTDRDP14 Maintain energised HV distribution overhead electrical apparatus (glove)

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 energised high voltage (HV) overhead electrical apparatus (glove) in the electricity supply industry (ESI).

It includes maintaining electrical apparatus using HV live line glove and barrier methods and verifying site conditions and potential hazards, confirming and calculating physical loads and the selection of appropriate and authorised work methods. It also includes preparing and cleaning specialist materials and tools in accordance with authorised technical instructions; undertaking legislative and safe working practices; rendering inoperative automatic re-closing devices, including restoration in accordance with work plans; and issuing/accepting electrical access permits and/or relevant working documents.

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 one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Distribution Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

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

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UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

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

UETTDREL16 Working safely near live electrical apparatus

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

UETTDRIS65 Contribute to coordinated HV live working

Competency Field

Distribution

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 energised HV distribution overhead electrical apparatus (glove and barrier)	**1.1** Works schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Job requirements and workplace procedures are identified and communicated with relevant personnel

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	1.5	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
	1.6	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	Clients/customers are provided with solutions within scope of specifications, costings and job requirements
	1.9	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to perform work, as required
	1.10	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.12	Traffic management is planned and implemented in accordance with workplace procedures
2 Carry out maintenance of energised HV distribution overhead electrical apparatus (glove and barrier)	**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	Emergency response procedures are performed in accordance with job requirements and/or workplace procedures
	2.3	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Auto-reclose devices and associated circuits are rendered inoperative and necessary work documentation obtained in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised and

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		hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures
	2.7	Maintenance of energised HV distribution overhead electrical apparatus is performed in accordance with works schedules, job requirements and workplace procedures
	2.8	Energised HV distribution overhead electrical apparatus is safely maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.9	Solutions to non-routine problems are identified and actioned in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the maintenance of energised HV distribution overhead electrical apparatus (glove and barrier)	**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 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	Relevant work permits are signed off and energised HV apparatus is returned to service in accordance with workplace procedures
	3.6	Work records, reports and/or documentation 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP14A Maintain energised HV distribution overhead electrical apparatus (glove).

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 UETTDRDP14 Maintain energised HV distribution overhead electrical apparatus (glove)

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 all of the following:
  - installing/replacing structures
  - installing/replacing hardware (e.g. cross-arm and insulator)
  - repairing conductors
  - installing/replacing/connecting bridge/bonding connections
- performing at least two (2) of the following:
  - installing/replacing pole mounted reclosers
  - installing/repairing/replacing air brake switches
  - installing/repairing/replacing high voltage (HV) links/disconnects
  - installing/removing temporary HV links/HV fuses
  - installing/repairing/replacing expulsion drop-out fuses
  - installing/replacing lightning arrestors
  - installing/replacing vibration dampers or aircraft warning markers
- performing work from at least two (2) of the following:
  - elevated work platform (EWP)
  - ladder
  - pole platform
  - insulated structured
- using at least one (1) of the following:
  - voltage detector
  - leakage detector
  - insulation test equipment
- 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:

- legislation and regulations, including:
  - legislation, standards and codes
  - supply authority regulations
  - industry guidelines and enterprise requirements
- safety precautions for HV live work associated to glove and barrier, including:
  - minimum approach distances
  - WHS/OHS hazard and precautions
  - assessing and controlling risks
  - personnel protective equipment (PPE)
  - HV live work access
  - auto-reclose function
  - fault current protective devices
  - integrity of insulation
  - specialised equipment and tools
  - inspection of equipment and tools
  - use of specialised equipment and tools
  - work team communication
  - use of safety observers
  - emergency response, first aid and rescue
- policies and procedures for glove and barrier work up to and including 33 kV, including:
  - policies, procedures and practices
  - definition of terms
  - responsibilities of personnel
  - types of structures
  - types of equipment and compliance
- glove and barrier techniques up to and including 33 kV, including:
  - HV insulators
  - HV cross-arms
  - HV bridge connections
  - installation and maintenance of equipment
  - temporary midspan switching devices
  - erection and replacement of poles
  - replacement of conductors and cables
  - HV armour rods and line guards
  - conversion intermediate to strain construction
  - switching devices

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- safety precautions for plant, equipment and tools, including:
  - safe working clearances
  - identification of WHS/OHS hazards
  - assessing and controlling risks and hazards
  - PPE
- identification and serviceability of plant, equipment and tools, including:
  - identification of plant, equipment and tools
  - serviceability of plant equipment and tools
- operational use of plant, equipment and tools, including:
  - conductor supports
  - selecting conductor support method
  - calculation of loads
  - effects of secondary loading
  - effects of resultant forces
  - conductor support rigging procedures
  - displacement of conductors utilising rigging equipment
- electrical and electrostatic principles, including:
  - relationship with current, voltage and resistance as related to distribution lines
  - phase voltage and respective line voltages
  - production of an electric field
- HV insulation including:
  - construction of disc insulators
  - construction of a polymeric insulator
  - checking integrity of insulation prior to work commencement
  - effects of electrical fields on disc insulators
  - number of disc insulators needed
  - performance of a failed disc insulator on the line and system
  - minimum number of discs per string
  - detecting failed disc insulators
- effects of electrostatic induction on the human body, including:
  - electrostatic induction and the human body
  - application of a Faraday cage
- switching surges and magnetic fields, including:
  - lightning and switching surges
  - magnetic fields
- HV switching fundamentals including:
  - standards, codes, legislation, supply authority regulations, industry guidelines and enterprise requirements
  - manuals system diagrams/plans and drawings
  - HV live work access authority/permit system - operational forms - HV switching or

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outage requests
    - fault current protection devices - main and backup devices, components, types, categories, applications, functions, principle of operation, coordination, zoning, auto-reclosing suppression, paralleling and separating, and ring verses radial feeders
    - disabling auto-reclose function
    - network interconnectors
    - test instruments
    - types and categories of switchgear - application, function and operating capabilities; and restrictions
    - operating switching apparatus - identifying hazards, assessing risks, systematic and defensive techniques, mobile radio and double insulation
    - HV electrical faults - types, causes and effects
- HV single wire earth return (SWER) system, including:
    - components
    - circuit arrangement
    - operation principles
    - faulty SWER earth system
    - SWER substations
- safety observer principles, including:
    - duties
    - techniques
    - minimum approach distances (MAD)
    - minimum safe working distance from vegetation
- feeder automation system, including:
    - function
    - main components
    - field devices
    - supervisory control and data acquisition (SCADA) systems, interlocks and operation
- SCADA systems, including:
    - function and main components
    - security interlocks and access restrictions
    - switching apparatus and retrieving data operation
    - field devices operation
- teamwork HV 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

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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 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, 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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UETTDRDP15 Inspect, maintain and restore energised low voltage overhead distribution network infrastructure

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 inspection of overhead structures, such as poles and/or other structures other than towers, and the maintenance of overhead energised low voltage (LV) conductors and cables. It includes the conducting of LV switching operations involving the operation of circuit breaking and isolation devices from a given switching schedule in accordance with enterprise procedures. It covers LV distribution systems in field situations but also includes paralleling in accordance with the switching schedule.

It also includes inspection of electrical apparatus, such as overhead conductors and or cables, underground and overhead transition points, electrical equipment, such as pole-mounted transformers, switchgear, hardware and/or earthing systems. It encompasses the completion of inspection reports and other relevant documentation in accordance with requirements.

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

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

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UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS46 Install and maintain ESI network infrastructure electrical equipment

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Distribution

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 the inspection, maintenance and restoration of overhead	**1.1** Works schedule(s), including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by

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distribution network infrastructure

site inspection

1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the inspection of overhead structures and electrical apparatus used on poles and/or structures, the maintenance of overhead energised LV conductors and cables and LV switching, are obtained and confirmed for the purposes of the work to be performed and communicated

1.4 Physical loads and calculations are confirmed according to requirements using essential knowledge and appropriate skill

1.5 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.6 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear according to established procedures

1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.8 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order

1.9 Specialist equipment for live work is inspected and confined in working order in accordance with requirements and established procedures

1.10 Relevant personnel at worksite are confirmed current in first aid, pole top rescue and other related work procedures according to requirements

1.11 Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are

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		resolved to carry out work where necessary
	1.12	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.13	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures
	1.14	Traffic management plan is identified and implemented
2 Carry out inspection, maintenance and restoration of overhead distribution network infrastructure	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed, and currency according to requirements confirmed
	2.3	Essential knowledge and associated skills are applied in the safe maintenance and restoration of overhead distribution network infrastructure to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.4	Inspection of overhead structures and electrical apparatus used on poles and/or structures is carried out in accordance with the work schedule and requirements/established procedures
	2.5	Maintenance, including repair and/or replacement of poles and/or structures, is carried out in accordance with the work schedule and requirements/established procedures
	2.6	Communications with Switching Control Officer are established and maintained throughout the isolation operation according to established procedures
	2.7	Electrical equipment and associated circuits line/network or worksite to be switched, including paralleling, is isolated and proved de-energised using appropriate devices and earthed, where required, according to requirements and established procedures

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	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.9	Unplanned events during the inspection, maintenance or switching procedures are undertaken within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the inspection, maintenance and restoration of overhead distribution network infrastructure	**3.1**	Work undertaken is checked against works schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
	3.5	Relevant work permits are signed off and overhead structures and electrical apparatus used on poles and/or structures are returned to service in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate personnel 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDP15A Inspect, maintain and restore energised low voltage overhead distribution network infrastructure.

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 UETTDRDP15 Inspect, maintain and restore energised low voltage overhead distribution network infrastructure

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
- inspecting three (3) of the following overhead structures and electrical apparatus:
  - poles and structures
  - overhead conductors/cables
  - underground/overhead transition points
  - electrical equipment
  - hardware
  - earthing systems
- conducting inspections using at least one (1) of the following:
  - ground
  - vehicle
  - helicopter
  - fixed wing
- using at least two (2) of the following inspection techniques:
  - visual*
  - infra-red camera
  - X-ray
  - camera
  - (*must do)
- maintaining at least two (2) of the following overhead energised low voltage (LV) conductors and cables:
  - copper
  - aluminium

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  - aluminium steel
  - steel
  - pilot
- using at least two (2) of the following access equipment:
  - elevated work platform (EWP)
  - ladder
  - portable platform
- using all of the following live LV working equipment:
  - insulating mats/sleeves
  - temporary bridging device
  - insulating gloves
  - insulated cable tensioning devices
  - ladder/pole shrouds
  - equipotential bonding
- using at least three (3) of the following testing and recording devices:
  - voltage detector*
  - clamp-on ammeter
  - polarity tester
  - insulation resistance tester
  - phase sequence indicator
  - recording meters
  - (*must do)
- performing LV switching to a given schedule and incorporating all of the following:
  - approvals/clearances
  - access authority/permits
- incorporating two (2) of the following:
  - voltage detectors
  - polarities testers
  - phase rotation indicators
- operating at least one (1) of the following switchgear types:
  - 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:

- powerline safety practices encompassing:

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- protective apparatus and apparel for linework:
  - responsibilities for the selection, use, maintenance and storage of protective apparatus and apparel
  - 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 ladders against a standing pole
  - maintenance checks on different types of ladders
  - renewal of extension ropes
  - 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
  - practical procedures 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 requirements
  - 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
  - precautions for personal protection when fighting small fires
- rescue victims from heights and confined spaces:
  - planning, identifying and establishing procedures and responses
  - developing techniques
  - involvement of external emergency services
  - emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
- requirements for aerial linework:
  - planning, establishing and implementing relevant aviation authority clearances
  - determining system requirements
  - aircrew familiarisation with network operations and equipment
  - requirements for effective communications operations for aerial work
- LV - energised LV equipment working practices for substations encompassing:
  - 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
  - release and rescue procedures for work on or near exposed energised LV conductors
- poles and structures inspection principles encompassing:
  - standards, codes, legislation, supply authority regulations and or enterprise requirements
  - characteristics of wood used for structures within the electrical distribution system:
    - relationship between timber and water
    - faults that occur that influence the integrity of the structure
    - effects of fungal activity, termite and borer activity and dry rot
  - chemical treatment principles:
    - types of chemical used to treat timber
    - regulations and procedures in handling and transporting chemicals safely
    - application procedures of chemicals to wood
  - deterioration prevention techniques:
    - relationship between steel, concrete and wood
    - inspection procedures for deterioration
    - deterioration prevention procedures in steel, concrete and wood
    - procedures for the repair of deterioration in steel, concrete and wood
- powerline inspection principles encompassing:
  - standards, codes, legislation, supply authority regulations and or enterprise requirements
  - ground line inspection procedures of electrical distribution structures:
    - requirements for pole inspection on electrical distribution structures
    - use of specific equipment and testing devices during testing/inspection
    - methods of recording data
  - overhead line inspection procedures of electrical distribution structures:
    - methods and requirements for overhead line inspection on electrical distribution structures
    - clearances for overhead conductors, cables and structures
    - use of specific equipment and testing devices during testing/inspection
    - methods of recording data
  - underground cable inspection procedures in the electrical distribution system:

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- state/territory industry policy and regulations
- methods and requirements for line inspection on underground cable terminations

- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear:
    - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
    - operating characteristics, advantages and disadvantages of different types of switchgear
    - installation procedures, earthing, 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
    - 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:
    - electricity supply industry standards and procedures
- LV switching principles encompassing:
  - 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
    - LV network interconnectors source of possible backfeed
  - LV switching techniques:
    - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures, earthing procedures
  - personnel protective equipment (PPE) for LV 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

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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 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, 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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UETTDRDP99 Test and verify distribution overhead installations

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 test and verify distribution overhead installations in the electricity supply industry (ESI).

It includes inspecting and testing processes necessary for verifying overhead distribution installations. It also includes using safe work practices and compliance with all requirements of visual inspections, mandatory, optional and functional test procedures, identifying non-compliance defects and reporting requirements.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

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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

Competency Field

Distribution

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 inspect, test and verify overhead distribution installation	**1.1** Works schedules, construction 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 accessing, testing and verifying overhead distribution installations 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed in accordance with workplace procedures

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	1.7	Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8	Specialist test and measurement equipment for testing and verification of overhead distribution installations are obtained, inspected and confirmed in working order and calibrated in accordance with requirements and workplace procedures
	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 plan is confirmed as being applied in accordance with workplace procedures
2 Carry out inspection, testing and verification of overhead distribution installation	**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	Inspection, safe access, testing and verification of overhead distribution installations are completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Overhead distribution installations and associated hardware are visually inspected, positioned, secured and terminated/connected in accordance with workplace procedures
	2.5	Energised tests and/or measurements to verify overhead distribution installations are determined in accordance with workplace safety procedures and relevant industry standards, as required
	2.6	Overhead distribution installations are checked for suitability and conformance with workplace procedures and relevant electrical network supply industry

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		standards
	2.7	Overhead distribution installation protection methods and devices are validated in accordance with workplace procedures and relevant distribution network protection industry standards
	2.8	Overhead distribution installation switchgear is validated in accordance with workplace procedures and relevant distribution network protection industry standards
	2.9	Overhead distribution installations earthing systems and multiple earth neutral (MEN) system components are verified as correctly installed and conforming to workplace procedures and relevant distribution network industry standards
	2.10	Mandatory tests are conducted to verify overhead distribution installation system voltage, phasing, phase rotation, polarity and neutral potential comply with relevant industry standards
	2.11	Solutions used to solve overhead distribution installation problems are applied in accordance with workplace procedures
	2.12	Quality checks of work are undertaken in accordance with workplace procedures
3 Report inspection and test findings	**3.1**	Hazards are identified, risks assessed and control measures implemented
	3.2	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.3	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	3.4	Worksite is rehabilitated, cleaned up and made safe and in accordance with workplace procedures
	3.5	Non-compliance defects are identified, corrected and/or reported in accordance with workplace procedures
	3.6	Recommendations for rectifying defects are made in accordance with workplace procedures

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3.7 Mandatory documentation is completed in accordance with workplace procedures and relevant industry standards

3.8 Tools, equipment and surplus resources are, where appropriate, cleaned, checked and returned in accordance with workplace procedures

3.9 Relevant work permits are signed off and electrical equipment (network infrastructure) are returned to service in accordance with workplace procedures

3.10 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 UETTDRDP99A Test and verify distribution overhead installations.

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 UETTDRDP99 Test and verify distribution overhead installations

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
- using inspection methods, including at least two (2) of the following:
  - visual*
  - infra-red camera
  - X-Ray
  - camera
  - binoculars/telescope
  - (* must do)
- inspecting structures, including any one (1) of the following:
  - pyramid
  - delta pi
  - enterprise specific type
- installing associated hardware, including at least three (3) of the following:
  - insulators
  - clamps
  - bolts
  - conductor spacers
  - vibration dampers
  - structural components
- inspecting conductors, including at least one (1) of the following:
  - copper
  - aluminium
  - steel
  - aluminium/steel reinforced

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- inspecting overhead installations from at least two (2) of the following:
  - elevated work platform (EWP)*
  - portable platform
  - gondola
  - hook ladder
  - elevated work box
  - (*must do)
- using specialist equipment, including all of the following:
  - voltage/de-energised indicating device
  - earthing conductors
- complying with all of the following:
  - reporting procedures
  - reporting outcomes.

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:

- legislated regulations, including:
  - legislation and regulations that require installations and equipment to be tested to ensure they are safe
  - the person/bodies responsible for the various aspects of ensuring distribution overhead installations are safe
  - results of tests that show a distribution overhead installation is safe for connection to the supply
  - 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 the distribution overhead installations electrical equipment are safe to use
- testing installations, including:
  - distribution system phasing, phase rotation and polarity is correct and conforms to network construction standards
- documentation, including:
  - results of tests conducted on a distribution overhead installation in accordance with work requirements and ensure the distribution overhead installation is safe
  - documents of periodic inspection and testing of distribution overhead installation and equipment in accordance with requirement
  - non-compliances and defects reported in accordance with established 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 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 testing and verifying distribution overhead installations
- 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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UETTDRDS31 Draft and layout a power system overhead distribution extension

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 planning and layout of one or two pole minor overhead distribution extensions, including estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques and layout to the field locations in accordance with enterprise requirements.

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

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

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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/plan to draft and layout an overhead distribution extension	**1.1** Works schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS/occupational health and safety (OHS) risks are assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

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		job are identified, scheduled and coordinated, and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out drafting and layout of an overhead distribution extension	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised person/s for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	The drafting and layout of an overhead distribution extension is carried out in accordance with the work

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		schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied for the drafting and layout of an overhead distribution extension to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete drafting and layout of an overhead distribution extension	**3.1**	Work undertaken is checked against works schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and the job is returned to service and advised to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS31A Draft and layout a power system overhead distribution extension.

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 UETTDRDS31 Draft and layout a power system overhead distribution extension

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
- drafting at least one (1) of the following:
  - a low voltage (LV) single phase distribution extension plan/layout
  - an LV multi-phase distribution extension plan/layout
- laying out at least one (1) of the following:
  - a high voltage (HV) single phase distribution extension
  - a HV multi-phase distribution extension
- 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:

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of LV and HV overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing

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        - removing, repairing and replacing of damage conductors
        - minimum clearances between overhead conductors and LV and HV structures
    - techniques for conductor installation:
        - types and application of tools, equipment and hardware
        - methods of stringing, tensioning and termination of LV and HV conductors
- installation of poles and or structures and hardware encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
    - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
        - characteristics and applications of different types of poles and associated hardware
    - techniques for installing poles and associated hardware:
        - types of installation equipment/tools
        - excavation methods
        - types of footings/foundations
        - types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and/or structures and cross-arms
    - techniques for maintenance of poles and associated hardware:
        - stabilisation techniques for unstable poles
        - methods of strengthen poles
        - maintenance and replacement of HV insulators and cross arms
- different types and function of distribution components encompassing:
    - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - types, function and characteristics of distribution components
    - safety policies, procedures and precautions related to the handling and installing of distribution components
- enterprise-specific switching diagrams and drawing encompassing:
    - 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 catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams:
        - LV system switching diagrams
        - direct current (d.c.) traction supply sectioning diagrams
        - HV transmission and distribution system symbols and feeder plans
        - processes of updating switching diagrams
- power distribution network documentation encompassing:

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  - requirements for the use of manuals, system diagrams/plans and drawings, and for plans such as work method statements for the control of WHS/OHS risks
  - types and application of power distribution network documentation drawings and documents:
    - wiring and schematic diagrams
    - drawings and switching symbols
    - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different diagrams and documentation on LV and HV systems:
    - overhead distribution extensions
    - underground distribution extensions
    - distribution substations
    - street lighting systems
- layout principles for overhead distribution encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings, and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length -
  - resources needed for the stringing and maintenance of conductors
  - types of low LV and HV overhead electrical conductor connections
  - minimum clearances between overhead conductors and LV and HV structures
  - estimation of the duration of overhead distribution extension project
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
  - techniques in measuring heights and distances
  - techniques in taking bearings angles of deviation using a compass
  - techniques in using a clinometer
  - techniques in recording and storage of data
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings

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- techniques in plotting long spans:
  - measuring stick, clinometer, trundle wheel and tapes
  - correction for sloping ground
  - distance across objects and range rods
- techniques in pegging pole positions:
  - foot path alignments
  - types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
  - Commonwealth, sate/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
  - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
  - techniques in storing and retrieving programs and files from the computer
  - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer
  - techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
    - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
  - calculation of dimensions and drafting measurements using the computer
  - techniques in the preparation of preliminary sketches using the computer
  - techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and/or upgrade draft or layout
  - techniques to diagnosing basic faults in computer operation
  - requirements for aerial linework:
    - planning, establishing and implementing relevant aviation authority clearances
    - determining system requirements
    - aircrew familiarisation with network operations and equipment
    - requirements for effective communications operations for aerial 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 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:

- 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 to draft and layout an overhead distribution extension
- 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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UETTDRDS32 Draft and layout a power system underground distribution extension

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 planning and layout of minor high voltage (HV) and low voltage (LV) underground distribution extensions, including the estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques, the pegging and/or marking out of the trench position, the pit/pillar position and the cable position according to the work order and enterprise requirements.

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

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

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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/plan to draft and layout an underground distribution extension	**1.1** Works schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

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		job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out drafting and layout of an underground distribution extension	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	The drafting and layout of an underground distribution extension is carried out in accordance with the work

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		schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied for drafting and layout of an underground distribution extension to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete drafting and layout of an underground distribution extension	**3.1**	Work undertaken is checked against works schedule for conformance with requirements, anomalies are reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and the job is returned to service and advised to client/customer in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS32A Draft and layout a power system underground distribution extension.

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 UETTDRDS32 Draft and layout a power system underground distribution extension

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
- drafting at least one (1) of the following:
  - high voltage (HV) multi-phase underground distribution extension plan/layout
  - a low voltage (LV) multi-phase underground distribution extension plan/layout
- laying out at least one (1) of the following:
  - a LV multi-phase underground distribution extension
  - a HV multi-phase underground distribution extension
- 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:

- installation of underground cable encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safety precautions specific to the installation of underground cables:
    - excavation and trench safety regulations
    - gas detection procedures
    - working in confined spaces
    - personal protective equipment (PPE)
    - hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cables
    - gas bottle testing procedures
    - permit to work systems and isolation procedures

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- trench excavation and reinstatement procedures
- installation of underground cable procedures:
  - types of tools and equipment
  - methods of installing conduits
  - methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
- procedures for the safe use of LPG equipment for cable jointing

- construction and types of underground cables encompassing:
  - safety precautions specific to handling underground cables
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - types and applications of underground cables
  - construction types and structures of underground cables
  - characteristics of different types of underground cables
  - ratings
- enterprise-specific switching diagrams and drawing encompassing:
  - 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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams:
    - LV system switching diagrams
    - direct current (DC) traction supply sectioning diagrams
    - HV transmission and distribution system symbols and feeder plans
    - processes of updating switching diagrams
- power distribution network documentation encompassing:
  - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types and application of power distribution network documentation drawings and documents:
    - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different diagrams and documentation on LV and HV systems:
    - overhead distribution extensions
    - underground distribution extensions
    - distribution substations
    - street lighting systems
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the

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surveying for an overhead and underground extension
    - techniques in measuring heights and distances
    - techniques in taking bearings angles of deviation using a compass
    - techniques in using a clinometer
    - techniques in recording and storage of data
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - techniques in plotting long spans:
        - measuring stick, clinometer, trundle wheel and tapes
        - correction for sloping ground
        - distance across objects and range rods
    - techniques in pegging pole positions:
        - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
    - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
    - techniques in storing and retrieving programs and files from the computer
    - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer
    - techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
        - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
    - calculation of dimensions and drafting measurements using the computer
    - techniques in the preparation of preliminary sketches using the computer
    - techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and/or upgrade draft or layout
    - techniques to diagnosing basic faults in computer operation
- layout principles for underground mains distribution extension encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
    - requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - methods in determining material, equipment and tool lists:
        - components types and quantity required
        - spacing of components and equipment

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    - costings of items and components
- purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
- determination of conductor size, type and route length
- resources needed for the laying of conductors
- determining the appropriate excavation for the location
- determining the size and depth of excavation
- determining the trench and pit layout procedures
- minimum clearances between conductors
- estimation of the duration of underground distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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
- 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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UETTDRDS33 Draft and layout a power system street lighting system

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 planning and layout of street lighting systems. It includes the conduction of site inspections to confirm and/or modify a street lighting system layout, estimation of costs and resources for the work order, and the pegging out of the poles/underground cables according to the work order and to optimise visibility and minimise traffic hazards. It also encompasses the provision of advice on conditions of supply and permits and the communication and coordination needed to be undertaken with the relevant authorities and clients.

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

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

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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/plan to draft and layout a street lighting system	**1.1** Works schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks are assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and in accordance with established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

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		job are identified, scheduled and coordinated and confirmed as safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the drafting and layout of a street lighting system	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	The drafting and layout of a street lighting system are carried out in accordance with the work schedule and

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		requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe drafting and layout of a street lighting system to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
3 Complete the drafting and layout of a street lighting system	**3.1**	Work undertaken is checked against works schedule for conformance with requirements, anomalies are reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and are returned to service and advised to client/customer in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS33A Draft and layout a power system street lighting system.

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 UETTDRDS33 Draft and layout a power system street lighting system

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
- producing all of the following:
  - preliminary plan for a street lighting system
  - a layout of a street lighting system
- 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:

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - construction types and structures for distribution and sub-transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing
    - removing, repairing and replacing of damage conductors
    - minimum clearances between overhead conductors and LV and HV structures

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- techniques for conductor installation:
  - types and application of tools, equipment and hardware
  - methods of stringing, tensioning and termination of LV and HV conductors
- installation of poles and/or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware:
    - types of installation equipment/tools
    - excavation methods
    - types of footings/foundations
    - types of attachments
    - earthing systems
    - clearances between conductors
    - safe methods of erecting and stabling poles and/or structures and cross-arms
  - techniques for maintenance of poles and associated hardware:
    - stabilisation techniques for unstable poles
    - methods of strengthen poles
    - maintenance and replacement of HV insulators and cross-arms
- procedures for installation and maintenance on public lighting structures and associated equipment encompassing:
  - standards, codes, legislation, supply authority regulations, local government and/or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
  - safety precautions specific to working on street lighting:
    - safe working practices and procedures
    - safe clearances from LV and HV mains
    - working at heights, working in confined spaces, permit to work systems and isolation procedures, emergency response and rescue, including first aid
  - basic public lighting principles:
    - electromagnetic spectrum
    - principles of colour
    - behaviour of light
    - factors that affect illumination
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - street lighting circuits
    - earthing system
  - types of tools and equipment used for installation and maintenance

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- types and function of lanterns/luminaires/lamps, control equipment, poles and associated hardware used for street lighting:
  - high pressure mercury vapour, low pressure and high pressure sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches and contactor boxes
- types of lighting systems:
  - overhead and underground street lighting systems
  - controlling and switching of lighting systems
- techniques for the installation of street lighting systems
- techniques for the maintenance of street lighting systems:
  - diagnosing of faults
  - removing, repairing, replacing and cleaning of public lighting and associated hardware
- application of specific testing equipment:
  - voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers and fault indictors
- techniques for the inspection, testing and commissioning of street lighting systems

- different types and functions of distribution components encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - types, function and characteristics of distribution components
  - safety policies, procedures and precautions related to the handling and installing of distribution components
- enterprise-specific switching diagrams and drawings encompassing:
  - 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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams:
  - LV system switching diagrams
  - direct current (DC) traction supply sectioning diagrams
  - HV transmission and distribution system symbols and feeder plans
  - processes of updating switching diagrams
- power distribution network documentation encompassing:
  - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types and application of power distribution network documentation drawings and documents:
    - wiring and schematic diagrams

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    - drawings and switching symbols
    - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different diagrams and documentation on LV and HV systems:
    - overhead distribution extensions
    - underground distribution extensions
    - distribution substations
    - street lighting systems
- layout principles for overhead distribution encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length -
  - resources needed for the stringing and maintenance of conductors
  - types of LV and HV overhead electrical conductor connections
  - minimum clearances between overhead conductors and LV and/HV structures
  - estimation of the duration of overhead distribution extension project
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
  - techniques in measuring heights and distances
  - techniques in taking bearings angles of deviation using a compass
  - techniques in using a clinometer
  - techniques in recording and storage of data
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - techniques in plotting long spans:
    - measuring stick, clinometer, trundle wheel and tapes
    - correction for sloping ground
    - distance across objects and range rods

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    - techniques in pegging pole positions:
        - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
    - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and or upgrade
    - techniques in storing and retrieving programs and files from the computer
    - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer
    - techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
        - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
    - calculation of dimensions and drafting measurements using the computer
    - techniques in the preparation of preliminary sketches using the computer
    - techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and/or upgrade draft or layout
    - techniques to diagnosing basic faults in computer operation
- principles to light design layout encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the light design principles
    - requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - types of tariffs and charges
    - types of street lighting components:
        - column types, foundations, brackets, luminaries and mounting heights
    - types of electrical street lighting circuits:
        - types of supply, lighting circuit and control circuit
    - fundamentals of lighting production:
        - electromagnetic spectrum
        - visible and non-visible radiation
        - spectral energy distribution
        - infra-red, ultra-violet (UV), radiation safety, incandescence and phosphorescence
        - reflection and refraction
    - fundamentals of lighting concepts:
        - terms and units
        - purpose of reflectors and diffusers

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- factors affecting external lighting design
- calculation of light output
- determining illuminance:
  - point to point method
  - lumen method
- determining rated life of luminaries
- fundamentals of street lighting design
- considerations for special lighting situations:
  - security lighting, hazardous street locations and emergency lighting

- principles to layout and draft a street lighting system encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to street lighting system layouts and drafts
  - requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - determination of street lighting positions for optimum visibility and to minimise traffic hazards
  - techniques in mounting and position of lights
  - resources needed for the installation of street lighting system
  - methods of pegging out of pole positions and/or underground cable positions
  - minimum clearances between overhead conductors and LV/and HV structures
  - estimation of the duration of overhead distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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.

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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 to undertake drafting and layout of a street lighting system.
- 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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UETTDRDS34 Draft and layout a power system distribution substation minor upgrade

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 drafting and laying out of minor low voltage (LV) distribution substation upgrades, including the estimating of the costs and/or resources for the work to be undertaken. It also encompasses on-the-job design, surveying techniques, the pegging and/or marking out of the trench position, the pit/pillar position and the cable position according to the work order and enterprise requirements.

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

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

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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/plan to draft and layout a distribution substation upgrade	**1.1** Works schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all work sites
	1.5 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures are prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and in accordance with established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the

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		job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the drafting and layout of a distribution substation upgrade	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Drafting and layout of a distribution substation upgrade is carried out in accordance with the work schedule and

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		requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe drafting and layout of a distribution substation upgrade to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the drafting and layout of a distribution substation upgrade	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies are reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and substation equipment, apparatus, wiring and instrumentation are returned to service and advised to client/customer in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS34A Draft and layout a power system distribution substation minor upgrade.

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 UETTDRDS34 Draft and layout a power system distribution substation minor upgrade

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
- drafting at least one (1) of the following:
  - a multi-phase pole mounted distribution transformer upgrade plan/layout
  - a single-phase pole mounted transformer upgrade plan/layout
- laying out at least one (1) of the following:
  - a multi-phase underground distribution substation upgrade
  - a multi-phase distribution substation or associated equipment upgrade. e.g. substations, transformers, high voltage (HV)/low voltage (LV) switchgear
- 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:

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of LV and HV overhead electrical conductor connections
    - causes and effects of poor electrical connections

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        - reasons for and methods used to maintain standard phase sequencing
        - removing, repairing and replacing of damage conductors
        - minimum clearances between overhead conductors and LV and HV structures
    - techniques for conductor installation:
        - types and application of tools, equipment and hardware
        - methods of stringing, tensioning and termination of LV and HV conductors
- installation of underground cable encompassing:
    - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
    - safety precautions specific to the installation of underground cable:
        - excavation and trench safety regulations
        - gas detection procedures
        - working in confined spaces
        - personal protective equipment (PPE)
        - hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cable
        - gas bottle testing procedures
        - permit to work systems and isolation procedures
    - trench excavation and reinstatement procedures
    - installation of underground cable procedures:
        - types of tools and equipment
        - methods of installing conduits
        - methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
    - procedures for the safe use of LPG equipment for cable jointing
- construction and types of underground cables encompassing:
    - safety precautions specific to handling underground cables
    - requirements for the use of enterprise manuals, system diagrams/plans and drawings
    - types and applications of underground cables
    - construction types and structures of underground cables
    - characteristics of different types of underground cables
    - ratings
- enterprise-specific switching diagrams and drawing encompassing:
    - 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 catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams:
        - LV system switching diagrams
        - direct current (DC) traction supply sectioning diagrams

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    - HV transmission and distribution system symbols and feeder plans
    - processes of updating switching diagrams
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents:
        - wiring and schematic diagrams, drawings and switching symbols
        - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on LV and HV systems:
        - overhead distribution extensions
        - underground distribution extensions
        - distribution substations
        - street lighting systems
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
    - techniques in measuring heights and distances
    - techniques in taking bearings angles of deviation using a compass
    - techniques in using a clinometer
    - techniques in recording and storage of data
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - techniques in plotting long spans:
        - measuring stick, clinometer, trundle wheel and tapes
        - correction for sloping ground
        - distance across objects and range rods
    - techniques in pegging pole positions:
        - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- fundamentals of computer-aided drafting (CAD) for drafting and layout of distribution extension and upgrades encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the drafting and layouts of distribution extensions and upgrades
    - types of computer hardware and software, tools and equipment for the production of a draft and layout of distribution extension and/or upgrade
    - techniques in storing and retrieving programs and files from the computer
    - identification and methods of retrieving and manipulating digital symbols, designs, layouts, fonts and graphs stored in the computer

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- techniques in using the CAD package in following necessary commands and protocols in accordance with the operating instructions of the CAD software manufacturer, such as:
  - using file structure, menu utilisation, system library usage, data banking, achieving, file management and maintenance procedures
- calculation of dimensions and drafting measurements using the computer
- techniques in the preparation of preliminary sketches using the computer
- techniques in using 2-D computer graphics system and associated equipment to produce a distribution extension and or upgrade draft or layout
- techniques to diagnosing basic faults in computer operation

- layout principles for underground mains distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
  - requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components and equipment
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the laying of conductors
  - determining the appropriate excavation for the location
  - determining the size and depth of excavation
  - determining the trench and pit layout procedures
  - minimum clearances between conductors
  - estimation of the duration of underground distribution extension project
- layout principles for a distribution substation minor upgrade encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to a distribution substation minor upgrade
  - requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components and equipment
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information

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- determination of conductor size, type and route length
- resources needed for the laying of conductors, cables and equipment
- determining the appropriate installation sequence
- minimum clearances between conductors and equipment
- estimation of the duration of underground distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 undertake drafting and layout of a distribution substation upgrade
- 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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UETTDRDS35 Design overhead distribution power 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 the technical design of overhead distribution and sub-transmission networks to relevant standards, including electrical clearances, electrical and mechanical loadings, earthing, environmental considerations, minor civil aspects and the handling of waterway, railway and other crossings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements, and incorporates the principles of safe design.

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

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

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Pathway Unit Group 1

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

Pathway Unit Group 2

UETTDRDS43 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

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 for and coordinate the safe design of overhead distribution systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of overhead distribution systems, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

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	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
2 Carry out and coordinate the safe design of overhead distribution systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and

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		preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the safe design of overhead distribution systems	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS35A Design overhead distribution power 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 UETTDRDS35 Design overhead distribution power 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
- completing six (6) compliant technical designs of an overhead distribution or sub-transmission system with at least one relating to each of the following project types:
  - multi-pole extensions
  - in-line pole relocations
  - multi-circuit overhead lines
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- mathematical techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications:
    - application of velocity, acceleration, force, density, torque and pressure
  - application of the International System of Units (SI) units

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- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing
    - removing, repairing and replacing of damage conductors
    - minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation:
    - types and application of tools, equipment and hardware
    - methods of stringing, tensioning and termination of LV and HV conductors
- installation of poles and/or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware:
    - types of installation equipment/tools
    - excavation methods

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        - types of footings/foundations, types of attachments
        - earthing systems
        - clearances between conductors
        - safe methods of erecting and stabling poles and/or structures and cross-arms
    - techniques for maintenance of poles and associated hardware:
        - stabilisation techniques for unstable poles
        - methods of strengthen poles
        - maintenance and replacement of HV insulators and cross-arms
- installation of metering and control equipment encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
    - types of meters:
        - kilowatt-hour meters single and polyphase
        - demand meters, recording meters and electronic recording metering systems summators
    - installation and removal methods:
        - direct connection and plug in method
        - enterprise specific
    - types of associated equipment and accessories:
        - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
    - testing procedures:
        - safety testing
        - polarity testing
- different types and function of distribution components encompassing:
    - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - types, function and characteristics of distribution components
    - safety policies and procedures precautions related to the handling and installing of distribution components
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV systems
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV single wire earth return (SWER) system encompassing:
    - application and function of SWER system components

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    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents:
        - wiring and schematic diagrams
        - drawings and switching symbols
        - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on LV and HV systems:
        - overhead distribution extensions
        - underground distribution extensions
        - distribution substations
        - street lighting systems
- layout principles for overhead distribution encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - methods in determining material, equipment and tool lists :
        - components types and quantity required
        - spacing of components such as equipment, poles and cross-arms
        - costings of items and components
    - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
    - determination of conductor size, type and route length
    - resources needed for the stringing and maintenance of conductors
    - types of LV and HV overhead electrical conductor connections
    - minimum clearances between overhead conductors and LV and/HV structures
    - estimation of the duration of overhead distribution extension project
- system components and layouts encompassing:
    - distribution system layouts:
        - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, SWER systems, spur, parallel and ring systems, typical substation types

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- transmission system layouts:
  - lines, buses, transformers and cables, line/bus layouts including single, double, ring and breaker and half systems, and HV crossing methods
- alternating current (AC) transmission system components encompassing:
  - support structures and reasons for selection
  - insulators and reasons for selection
  - conductors and reasons for selection
  - vibration management systems and principles
  - line ratings based on voltage, span, tension and temperature
- AC transmission line electrical parameters encompassing:
  - typical arrangements
  - parameters of significance
  - calculation of line parameters:
    - calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
  - comparison with actual values
  - typical parameter values and ratios for different voltage level lines
- AC transmission line models encompassing:
  - types of transmission line models based on line length
  - calculation of voltage drop, line regulation and transmission efficiency
  - load sharing between lines
- basic design features and characteristics of poles/structures and associated equipment and/or components encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
  - distribution systems principles:
    - terminologies
    - primary and secondary
    - voltage levels
    - supply quality
    - load curve profiles (residential/industrial/commercial)
    - types of feeders
    - urban and rural single-phase systems
    - SWER
  - characteristics of poles:
    - types of poles (wood, concrete and steel)
    - installation methods of poles (tooling, rake, life, labelling and sinking)
    - maintenance techniques of poles (above and below ground pole strength and loads)
  - characteristics of associated equipment used on poles and structures:
    - cross-arms (types and standard sizes)

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    - insulators
- basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and/or components encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
    - overhead lines characteristics:
        - type of components
        - characteristics of conductor material
        - mechanical limitations and physical dimensions of lines
        - current rating factors (heating, voltage drops, power losses) of conductors
        - aerial bundled cables (HV and LV)
        - covered conductors
    - characteristics and constructional features of poles and structures:
        - types of poles and structures
        - characteristics of poles/structure materials
        - mechanical limitations of poles/structures
        - footings and additional support techniques
    - characteristics and constructional features of underground cables:
        - underground cables constructional features
        - insulation materials and abbreviations
        - cable dielectrics, electric stress and cable voltage drop
    - calculation of cable voltage drop in relation to length of cable run
    - techniques in reducing electrical stress on cables
    - cable rating factors
    - methods of joining and terminating cables
    - techniques in the installation of cables above and below ground
    - techniques in cable testing and the location of cable faults
    - techniques in cable drawing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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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, 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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UETTDRDS36 Design underground distribution power 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 the technical design of underground distribution and sub-transmission networks to relevant standards, including cable sizing and locations, soil resistivity and heat dissipation, backfill and trenching details, minor civil aspects and dynamic and cyclic ratings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements and encompasses the principles of safe design.

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

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

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Pathway Unit Group 1

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

Pathway Unit Group 2

UETTDRDS43 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

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 for and coordinate the safe design of underground distribution systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of underground distribution systems, are reviewed and determined
	1.2 Purpose of the design is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures or policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

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	1.5	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce, and individuals in accordance with established procedures
2 Carry out and coordinate the design of underground distribution systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models for the design of the underground distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

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		with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of underground distribution systems	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS36A Design underground distribution power

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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 UETTDRDS36 Design underground distribution power 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
- completing six (6) technical designs of an underground distribution or sub-transmission network relating to the following project types:
  - residential subdivision developments
  - industrial/commercial subdivision developments
  - alteration to existing assets
  - underground supplies to single customers, including projects requiring substations
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- dealing with unplanned events on at least one 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:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications:
    - Application of velocity, acceleration, force, density, torque and pressure

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- applications of the International System of Units (SI) units
- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- installation of underground cable encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safety precautions specific to the installation of underground cable:
    - excavation and trench safety regulations
    - gas detection procedures
    - working in confined spaces
    - personal protective equipment (PPE)
    - hazards for the use of liquid petroleum gas (LPG) equipment for jointing of underground cable
    - gas bottle testing procedures
    - permit to work systems and isolation procedures
  - trench excavation and reinstatement procedures
  - installation of underground cable procedures:
    - types of tools and equipment
    - methods of installing conduits
    - methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
  - procedures for the safe use of LPG equipment for cable jointing
- construction and types of underground cables encompassing:
  - safety precautions specific to handling underground cables
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - types and applications of underground cables
  - construction types and structures of underground cables
  - characteristics of different types of underground cables

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- ratings
- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV) systems
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- the implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:
  - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission:
    - Commonwealth/state/territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
  - identification, assessment, control and monitoring of the hazards to the environment associated with the powerline industry
  - workplace environment quality standards enterprise plan:
    - setting of acceptable emission level limits from power plant equipment
    - impact of the enterprise activities on air and water quality
    - nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage and insulation breakdown products)
  - provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
  - gathering of environment management information
  - maintenance of environmental records
  - risk assessment and its management in powerline industry
  - maintenance strategies for environment protection programs:
    - developing processes for promoting, maintaining and improving environmental impact in the workplace
    - identifying techniques for evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system
    - Environment Protection Authority (EPA) consultation and accident/incident investigations
- layout principles for underground mains distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
  - requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the

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control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components and equipment
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the laying of conductors
  - determining the appropriate excavation for the location
  - determining the size and depth of excavation
  - determining the trench and pit layout procedures
  - minimum clearances between conductors
  - estimation of the duration of underground distribution extension project
- system components and layouts encompassing:
  - distribution system layouts:
    - overhead/underground and/or urban/rural
    - HV customers
    - high rise building systems
    - three phase lines
    - single phase lines
    - single wire earth return (SWER) systems
    - spur, parallel and ring systems
    - typical substation types
  - transmission system layouts:
    - lines, buses, transformers and cables
    - line/bus layouts, including single, double, ring and breaker and half systems
    - HV crossing methods
- basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and/or components encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - overhead lines characteristics:
    - type of components
    - characteristics of conductor material
    - mechanical limitations and physical dimensions of lines
    - current rating factors (heating, voltage drops and power losses) of conductors
    - aerial bundled cables (HV and low voltage (LV)
    - covered conductors
  - characteristics and constructional features of poles and structures:

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    - types of poles and structures
    - characteristics of poles/structure materials
    - mechanical limitations of poles/structures, footings and additional support techniques
- characteristics and constructional features of underground cables:
    - underground cables constructional features
    - insulation materials and abbreviations
    - cable dielectrics, electric stress and cable voltage drop
- calculation of cable voltage drop in relation to length of cable run
- techniques in reducing electrical stress on cables
- cable rating factors
- methods of joining and terminating cables
- techniques in the installation of cables above and below ground
- techniques in cable testing and the location of cable faults
- techniques in cable drawing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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
- 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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UETTDRDS37 Design power system distribution substations

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 technical design of distribution substations to relevant standards and specifications, including earthing, location of substation relevant to load, customer and environmental needs and minor civil aspects. It also includes the necessary established procedures to ensure the substation design conforms to specific organisational technical standards, operational and system planning requirements and encompasses the principles of safe design.

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

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

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Pathway Unit Group 1

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

Pathway Unit Group 2

UETTDRDS43 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

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 for and coordinate the safe design of distribution substations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of distribution substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

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	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the design of distribution substations	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

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		with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of distribution substations	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS37A Design power system distribution substations.

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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 UETTDRDS37 Design power system distribution substations

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
- completing six (6) technical designs of a distribution substation relating to at least two of the following project types:
  - multi-transformer substations
  - residential developments
  - industrial/commercial developments
  - alteration to existing assets
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist, which lists all of the required design activities to be carried out in this process
- 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:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications:
    - application of velocity, acceleration, force, density, torque and pressure

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- applications of the International System of Units (SI) units
- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- generation systems encompassing:
  - methods of generating electricity:
    - types of power stations and reasons for their location
    - layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements:
    - operating speeds for thermal and hydroelectric generating sets
    - typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- substations and power transformers encompassing:
  - relationship between the substations within an overall power system:
    - purpose and location in relation to load centres
    - layout of high voltage (HV) equipment within the substation and auxiliary equipment
  - characteristics of a power transformer:
    - basic construction of distribution transformers
    - operation under load/no load conditions
    - types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers:
    - function and basic operation
  - maintenance of a power transformer:
    - basic connections
    - restrictions to parallel operation
    - problems and remedies associated with harmonics
    - testing and fault-finding procedures
  - characteristics of a :

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    - description and purpose
- the installation of metering and control equipment encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
    - types of meters:
        - kilowatt-hour meters single and polyphase
        - demand meters
        - recording meters and electronic recording metering systems summators
    - installation and removal methods:
        - direct connection and plug in method
        - enterprise specific
    - types of associated equipment and accessories:
        - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
    - testing procedures:
        - safety and polarity testing
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV systems
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- the installation of switchgear and associated equipment encompassing:
    - types and function of various switchgear:
        - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
        - operating characteristics
        - advantages and disadvantages of different types switchgear
        - installation procedures
        - earthing requirements and techniques
    - types of equipment include:
        - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
    - installation procedures for switchgear and equipment encompassing:
        - 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

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- testing and commissioning:
  - ESI standards and procedures
- HV distribution transformer principles encompassing:
  - 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
- feeder automation system encompassing:
  - function of feeder automation system and the main components
  - operation procedure for a remote field device from a local control station
  - functions of system 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
- environmental fundamentals encompassing:
  - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the control of environment associated with the worksite encompassing, relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations and relevant community planning and development agreements (land care agreements)
  - employer and employee responsibilities
  - methods of obtaining information on environmental issues and updates
  - methods of identifying environmental impacts from work related activities
  - meaning of environmental terms encompassing:
    - identification, assessment and control of risks
    - compliance and best practice and sustainable energy
  - procedures in implementing management plans to ensure compliance
- layout principles for a distribution substation minor upgrade encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to a distribution substation

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minor upgrade
  - requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components and equipment
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the laying of conductors, cables and equipment
  - determining the appropriate installation sequence
  - minimum clearances between conductors and equipment
  - estimation of the duration of underground distribution extension project
- fundamentals of distribution transformers encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the safe operation and testing of distribution transformers and auxiliary equipment
  - drawing layouts, conventions and symbols,
    - vector group of transformers
    - three phase transformers
  - construction of a distribution transformer
  - characteristics when operated under load and no-load conditions
  - percentage impedance determinations by test and calculation
  - function and operation of tap charging switches, including solid state tap changing equipment
  - function and operation of transformer auxiliary equipment
  - problems caused by harmonics in transformers
  - methods and equipment used to overcome harmonics in transformers
- testing procedures of distribution transformers encompassing:
  - safety precautions specific to the testing of distribution transformers
  - procedures for safely connecting distribution transformers for testing
  - testing of distribution transformers to determine losses
  - calculation of transformer’s efficiency
  - methods and types of equipment used to cool transformers:
    - properties of transformer oil and tests performed on transformer oil
  - techniques in performing selected tests on transformer oil
  - techniques in performing testing procedures on armer
  - techniques in testing distribution transformers
  - distribution transformer parallel connections:

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    - conditions and restrictions for parallel operations
  - calculations of loading on transformers operating in parallel
  - connection of transformer in parallel to supply a common load
- distribution earthing system encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to the distribution earthing system
  - reason and types of distribution earthing systems
  - terminologies used in the earth systems including, touch and step potential
  - conditions associated when an active HV conductor fails to earth
  - selection of earthing electrodes and grids
  - determination of the earthing resistance of copper clad rods using earthing monograms.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRDS38 Design power system public lighting 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 the technical design of public lighting systems. This includes pedestrian and traffic route lighting to relevant Australian Standards utilising appropriate software to generate design conformance.

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

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

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy

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management policies & procedures

Pathway Unit Group 1

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

Pathway Unit Group 2

UETTDRDS43 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

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 for and coordinate the safe design of public lighting systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures which may influence the design of public lighting systems are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a

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		quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personal, equipment, tools and PPE required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2 Carry out and coordinate the design of public lighting systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and

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		preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of public lighting systems	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS38A Design power system public lighting 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 UETTDRDS38 Design power system public lighting 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
- completing six (6) technical designs of a public lighting system utilising at least three of the following project types:
  - single light on existing assets
  - main road/minor road schemes
  - intersections
  - traffic management devices
  - alteration to existing assets
  - multi-circuit systems
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:

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- identification of basic concepts, principles and applications:
  - application of velocity, acceleration, force, density, torque and pressure
- applications of the International System of Units (SI) units
- the relationship between work, power and energy
- behaviour of object under force:
  - using a block and tackle under load
  - concept of mechanical advantage
  - determination of resultant forces
  - determining the sag in a catenary conductor and the force applied at each end
- fundamentals of the basic laws of fluid mechanics

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications:
    - properties of tensile strength
    - effects of temperature on the expansion of metals
    - ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system:
    - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
  - characteristics of a transmission, distribution and rail system:
    - principal components
    - typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system:
    - advantages/disadvantage
    - applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts:
    - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the HV equipment associated with substations
- procedures for installation and maintenance on public lighting structures and associated equipment encompassing:
  - standards, codes, legislation, supply authority regulations, local government and/or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
  - safety precautions specific to working on street lighting:
    - safe working practices and procedures

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    - safe clearances from low voltage (LV) and high voltage (HV) mains
    - working at heights, working in confined spaces, permit to work systems and isolation procedures
    - emergency response and rescue, including first aid
  - basic public lighting principles:
    - electromagnetic spectrum
    - principles of colour
    - behaviour of light
    - factors that affect illumination
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - street lighting circuits and earthing system
  - types of tools and equipment used for installation and maintenance
  - types and function of lanterns/luminaires/lamps, control equipment, poles and associated hardware used for street lighting:
    - high pressure mercury vapour, low pressure and high pressure sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches and contactor boxes
  - types of lighting systems:
    - overhead and underground street lighting systems and controlling and switching of lighting systems
  - techniques for the installation of street lighting systems
  - techniques for the maintenance of street lighting systems:
    - diagnosing of faults
    - removing, repairing, replacing and cleaning of public lighting and associated hardware
  - application of specific testing equipment:
    - voltage detectors
    - insulation resistance testers
    - clamp-on ammeters
    - continuity testers
    - fault indictors
  - techniques for the inspection, testing and commissioning of street lighting systems
- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV systems
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of light design layout encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the light design

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principles

- requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
- types of tariffs and charges
- types of street lighting components:
  - column types, foundations, brackets, luminaries and mounting heights
- types of electrical street lighting circuits:
  - types of supply
  - lighting circuit and control circuit
- fundamentals of lighting production:
  - electromagnetic spectrum
  - visible and non-visible radiation
  - spectral energy distribution
  - infra-red, ultra-violet, radiation-safety, incandescence and phosphorescence
  - reflection and refraction
- fundamentals of lighting concepts:
  - terms and units and the purpose of reflectors and diffusers
- factors affecting external lighting design
- calculation of light output
- determining illuminance:
  - point to point and lumen method
- determining rated life of luminaries
- fundamentals of street lighting design
- considerations for special lighting situations:
  - security lighting, hazardous street locations and emergency lighting

- principles to layout and draft a street lighting system encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to street lighting system layouts and drafts
  - requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists:
    - components types and quantity required
    - spacing of components, such as equipment, poles and cross-arms
    - costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - determination of street lighting positions for optimum visibility and to minimise traffic

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hazards
- techniques in mounting and positioning of lights
- resources needed for the installation of street lighting system
- methods of pegging out of pole positions and/or underground cable positions
- minimum clearances between overhead conductors and LV/and HV structures
- estimation of the duration of overhead distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

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 preparation of detailed plans to be used during the design phase and preparation of as-built drawings during the construction phase and utilised by network owners as technical reference materials to detail system infrastructure. It includes the use of computer-aided drafting (CAD) or other relevant drafting methods.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 for and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures, which may influence the preparation and management of detailed construction plans for electrical system infrastructure, are reviewed and determined
	1.2 Purpose of the construction plans is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established organisational procedures, policies and specifications for the construction plans are obtained or established with appropriate personnel
	1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.5 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

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	1.8	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.9	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the preparation and management of detailed construction plans for electrical system infrastructure	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Mathematical models of the system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.4	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the preparation and management of detailed construction plans for electrical system	**3.1**	Final inspections of the construction plans are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief

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infrastructure

3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of construction plan documents are issued and records are updated 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 UETTDRDS39A Prepare and manage detailed construction plans for electrical power system infrastructure.

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 UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

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
- preparing six (6) compliant detailed plans that relate to the following project types:
  - overhead line designs
  - underground line designs
  - distribution substations designs
  - transmission and sub-transmission substation designs
  - public lighting designs
  - zone substation designs
  - customer substation designs
- 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:

- working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage (ELV), low voltage (LV) and high voltage (HV) hazards and high current hazards encompassing:
  - risk management and assessment of risk encompassing, principle and purpose of risk management and the processes for conducting a risk assessment
  - hazards associated with LV, ELV and HV:
    - arrangement of power distribution and circuits in an electrical installation
    - parts of an electrical system and equipment that operate at LV and ELV

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    - parts of an electrical system and equipment where high currents are likely
  - risks and control measures associated with HV:
    - parts of an electrical system and equipment that operate at HV
    - the 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
  - optical fibre safety:
    - coherent optical sources, joining procedures and laser safety class 3a devices or their replacement
  - risks and control measures associated with LV:
    - modifying electrical installations, fault finding, maintenance and repair
    - control measures before, during and after working on electrical installations, circuits or equipment
    - isolation and tagging-off procedures
    - risks and restrictions of live work
    - control measures for live work
  - risks and control measures associated with harmful dusts and airborne contaminants:
    - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials
  - 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
- WHS/OHS enterprise responsibilities encompassing:
  - provisions of relevant health and safety 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 system 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
  - assessing resources to establish and maintain WHS/OHS management systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system:
    - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
  - characteristics of a transmission, distribution and rail system:

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        - principal components
        - typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
    - relationship between an overhead and underground supply systems within an overall power system:
        - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
    - single line drawings and layouts:
        - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the HV equipment associated with substations
- installation of overhead distribution conductors encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
        - material lists, conductor size, type and route length
    - constructions types and structures for distribution and sub-transmission lines
    - types, sizes and characterises of overhead conductors
    - resources for the stringing and maintenance of conductors:
        - types of LV and HV overhead electrical conductor connections
        - causes and effects of poor electrical connections
        - reasons for and methods used to maintain standard phase sequencing, removing, repairing and replacing of damage conductors
        - minimum clearances between overhead conductors and LV and HV structures
    - techniques for conductor installation:
        - types and application of tools, equipment and hardware
        - methods of stringing, tensioning and termination of LV and HV conductors
- powerline safety practices encompassing:
    - 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

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    - height safety principles, including personal fall protection, prevention and related requirements
    - practical procedures 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 requirements
    - 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
    - precautions for personal protection when fighting small fires
  - rescue victims from heights and confined spaces:
    - planning and identifying procedures, and establishing responses and developing techniques
    - involvement of external emergency services
    - emergency procedures for the rescue of an electric shock victim, including cardiopulmonary resuscitation (CPR)
  - requirements for aerial linework:
    - planning, establishing and implementing relevant aviation authority clearances
    - determining system requirements
    - aircrew familiarisation with network operations and equipment
    - requirements for effective communications operations for aerial work
- implementation and monitoring requirements for powerline safety encompassing:
  - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of WHS/OHS in the workplace:
  - Commonwealth/state/territory legislation relevant to the workplace and the meaning of general duty of care under WHS/OHS legislation and common law
  - workplace WHS/OHS enterprise plan:
    - responsibilities of each member of the work team
    - review process for changing/improving WHS/OHS safety plan/standing instructions for the systematic management of WHS/OHS in the workplace
  - relationship between the WHS/OHS committee and employees:
    - methods used to collate and distribute/disseminate WHS/OHS information
    - staff development activities and legislation requirements with regards to WHS/OHS training
    - methods of addressing barriers such as literacy and cultural differences
    - provisions relating to WHS/OHS issue resolution
  - hazards associated with powerline industry:
    - identification of hazards in the workplace

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        - processes used and contributing factors to a hazardous situation assessment of risks and control of WHS/OHS risks (risk management),
        - the hierarchy of control and monitoring of risk control measures
    - risk assessment and its management in powerline industry:
        - principles and purposes of risk management
        - processes for conducting risk assessment, including risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
    - maintenance strategies for WHS/OHS programs:
        - developing processes for promoting, maintaining and improving WHS/OHS in the workplace
        - identify techniques for the evaluating and reviewing WHS/OHS education and training programs and elements of an effective WHS/OHS management system
        - WHS/OHS consultation and accident/incident investigations
- principles of safe design encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
    - application of safe design principles:
        - safe design duty-related information
        - safe design process related information and safe design evaluations
- HV single wire earth return (SWER) system encompassing:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- enterprise-specific switching diagrams and drawing encompassing:
    - types and application of enterprise-specific switching drawings and :
        - wiring and schematic diagrams and switching symbols
        - mechanical drawings dealing with switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams:
        - LV system switching diagrams
        - direct current (DC) traction supply sectioning diagrams
        - HV transmission and distribution system symbols and feeder plans
        - processes of updating switching diagrams
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings and for plans

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such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents:
        - wiring and schematic diagrams
        - drawings and switching symbols
        - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on LV and HV systems:
        - overhead distribution extensions
        - underground distribution extensions
        - distribution substations
        - street lighting systems
- system components and layouts encompassing:
    - distribution system layouts:
        - overhead/underground
        - urban/rural
        - HV customers
        - high rise building systems
        - three phase lines and single phase lines
        - SWER systems
        - spur, parallel and ring systems
        - typical substation types
    - transmission system layouts:
        - lines, buses, transformers and cables
        - line/bus layouts, including single, double, ring and breaker, and half systems
        - HV crossing methods
- circuit breaker auxiliary systems encompassing:
    - types and characteristics of high pressure air systems, including air storage and air handling processes
    - types and characteristics of DC systems, including battery types, charging systems and protection systems
    - types and characteristics of special ambient gases (SF6) systems, including gas conditioning, storage and handling systems
    - types and characteristics of vacuum interrupters
    - types and characteristics of oil filled and oil handling
- DC transmission systems encompassing:
    - structure of DC transmission systems
    - types of equipment required for DC transmission systems
    - types of connections used for DC transmission systems
    - principles of control of DC transmission systems

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  - advantages of DC transmission in comparison to alternating current (AC) transmission
  - disadvantages of DC transmission in comparison to AC transmission
- AC transmission line electrical parameters encompassing:
  - typical arrangements
  - parameters of significance
  - calculation of line parameters:
    - calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
  - comparison with actual values
  - typical parameter values and ratios for different voltage level lines
- AC transmission line models encompassing:
  - types of transmission line models based on line length
  - calculation of voltage drop, line regulation and transmission efficiency
  - load sharing between lines
- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of HV and LV
  - voltage control devices:
    - 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 compensators (SVC) SVC's includes saturated reactor compensators; thyristor controlled reactor compensators and combined systems
  - production of harmonics and methods of harmonic control
  - location of voltage control devices within the system
- voltage control devices encompassing:
  - typical devices applications and capacities
  - estimation of rating of VAR regulating devices using graphical techniques
- system components and layouts encompassing:
  - distribution system layouts:
    - overhead/underground
    - urban/rural
    - HV customers
    - high rise building systems
    - three phase lines and single phase lines
    - SWER systems
    - spur, parallel and ring systems
    - typical substation types
  - transmission system layouts:

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    - lines, buses, transformers and cables
    - line/bus layouts, including single, double, ring and breaker, and half systems
    - HV crossing methods
- corona encompassing:
  - factors leading to the generation of corona:
    - voltage levels
    - conductor spacings, conductor sizes and shaping
    - atmospheric conditions
  - consequences of corona
  - corona reduction:
    - conductor selection
    - conductor bundling
    - conductor surface treatment
    - grading rings
  - internal discharge:
    - causes of internal discharge
    - effects of internal discharge
    - testing techniques
- protection system types encompassing:
  - requirements of a protection scheme:
    - relationship to primary system design
    - purpose of protection, safety of persons and protection of plant
    - system instability
    - system break up
    - loss of customers and loss of revenue
    - protection zones
    - restricted schemes and unrestricted schemes
    - duplicate protection
    - local backup protection and remote backup protection
    - selectivity, discrimination, stability, sensitivity and reliability
  - components of a protection scheme:
    - current transformers, potential transformers, summation current transformers, interposing transformers and multi-tapped transformers
    - all-or-nothing relays, induction relays, balanced beam relays, directional relays, biased relays, solid state relays, microprocessor-based relays and gas relays
    - thermal sensors
    - hardwired communication
    - powerline carrier systems
    - microwave systems
    - fibre optic systems

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    - need for isolation
    - 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 detailed construction plans for electrical system infrastructure
- 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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UETTDRDS40 Prepare and appraise power systems financial impact statements

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 creation, interpretation and application of financial impact statements in electricity network infrastructure augmentations, maintenance and construction activities. It includes project scoping, cost estimating, providing economic justifications and cost-benefit analysis, and the use of guarantee and capital contribution arrangements with customers.

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

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

UEENEEE104A Solve problems in d.c. circuits

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Testing Pathway Unit Group

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UEENEED104A Use engineering applications software on personal computers

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS22 Commission interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS35 Maintain complex network protection and control systems

Design Pathway Unit Group

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

Competency Field

Design

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 for and coordinate the preparation and appraisal of financial impact statements	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation and appraisal of financial impact statements, are reviewed and determined
	1.2 Purpose of the financial statement is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established procedures, policies and specifications for financial impact statement preparation and appraisal are

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		obtained or established with appropriate personnel
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.5	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.6	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.7	Personnel participating in the work are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the preparation and appraisal of financial impact statements	**2.1**	Circuit system modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.4	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
3 Complete and coordinate the preparation and	**3.1**	Final inspections of the financial impact statement are undertaken to ensure they comply with all requirements

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appraisal of financial impact statements		and include all specifications and documentations needed to complete the appraisal brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of financial impact statement documents are issued and records are updated 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 UETTDRDS40A Prepare and appraise power systems financial impact statements.

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 UETTDRDS40 Prepare and appraise power systems financial impact statements

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
- completing six (6) designs in total, drawn from at least two (2) of the following project types:
  - overhead line designs
  - underground line designs
  - distribution substation designs
  - customer substation designs
  - transmission substation designs
  - sub-transmission substation designs
  - public lighting designs
  - zone substation designs
  - substation secondary systems – commissioning
  - substation secondary systems – maintenance and augmentation
  - generation secondary systems – commissioning
  - generation secondary systems – maintenance and augmentation
  - high voltage (HV) primary plant – commissioning
  - HV primary plant – maintenance and augmentation
- developing financial impact statements, including activities addressing the correction of errors in the process
- 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:

- principles of safe design encompassing:

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- Commonwealth/sate/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
- particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- application of safe design principles:
  - safe design duty related information
  - safe design process related information
  - safe design evaluations

- methodology used in writing enterprise-specific management reports encompassing:
  - Commonwealth, state/territory and local government legislation, supply authority regulations standards, code, and/or enterprise requirements applicable to the writing enterprise-specific management reports
  - techniques in researching, collating and analysing information for the report:
    - recording, filing and retrieving systems
    - storing and retrieving data from computer systems
  - relationship of management reports to enterprise policies and procedures:
    - enterprise structure and resources
    - WHS/OHS and risk management enterprise data, financial and operational data
  - environmental enterprise policies and procedures
  - industrial relations policies and procedures
  - anti-discrimination policies and procedures:
  - techniques in writing enterprise-specific management reports:
    - methods used to disseminate information and facilitate enterprise requirements
    - document proformas and compliance and legislative requirements to produce effective reports in the appropriate format
- financial impact statements encompassing:
  - techniques in budgeting and tracking project progress
  - preparation and analysis of budget figures
  - techniques in the coordination of contingencies and risks that have a budget effect
  - techniques in dealing with problems that have a budget effect
  - examples of forms of recording project status and costings
  - application of relevant computer software packages
  - methods of prepare proposals:
    - preparing specifications, tender and evaluation and letting of tenders
  - techniques in estimating:
    - contract documents, drawings, specifications, general conditions and special conditions
  - resources costs:
    - hourly rates (labour, plant, material, subcontractors)
    - direct and indirect costs, contingency costs, project margin, cost of money, budget,

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        preliminary tender, labour costing and equipment costing
      - economic comparisons and contract variations
    - techniques in preparing and interpreting proposals and tender documents
    - techniques in preparing cost estimates for a project from relevant data
    - techniques in preparing financial impact statements
- project management encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the duties and responsibilities for management a project
    - analyse functions of project management to determine achievement of project objectives
    - relationship of stakeholders to the project
    - techniques in development of project plan:
      - project integration, scope, timelines, cost, quality, resources, communication/protocol requirements, risk/uncertainties and procurement and contacting
    - relationship between project processes, project life and project phases
    - planning and control procedures, resource management and risk management
    - techniques, methodologies and tools available to project managers
    - types of internal and external environmental factors that may affect the project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 to perform preparation and appraisal of financial impact statements
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UETTDRDS41 Manage electrical power systems infrastructure projects

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 work planning, resource requirements and financial control of infrastructure projects being undertaken within the distribution, sub-transmission and transmission, overhead and underground networks. It includes project management activities, which may involve the simultaneous management of many projects, and must encompass at least 20 identifiable tasks.

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

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

UEENEEE104A Solve problems in d.c. circuits

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Testing Pathway Unit Group

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UEENEED104A Use engineering applications software on personal computers

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS22 Commission interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS35 Maintain complex network protection and control systems

Design Pathway Unit Group

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

Competency Field

Design

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 for and coordinate the management of electrical infrastructure projects	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of electrical infrastructure projects, are reviewed and determined
	1.2 Purpose of the electrical infrastructure project is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the electrical infrastructure project are

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		obtained or established with appropriate personnel
	1.4	Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out and coordinate the management of electrical infrastructure projects	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or

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		established procedures
	2.3	Mathematical models of relevant networks are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.4	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.8	Electrical infrastructure decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.9	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
3 Complete and coordinate the management of electrical infrastructure projects	**3.1**	Final inspections of the infrastructure are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of project documents are issued and records are updated 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS41A Manage electrical power systems infrastructure projects.

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 UETTDRDS41 Manage electrical power systems infrastructure projects

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
- managing at least six (6) projects that each encompass at least twenty (20) identifiable tasks and relate to four (4) of the following project types:
  - distribution overhead projects
  - distribution underground projects
  - distribution substation projects
  - public lighting projects
  - zone substation projects
  - transmission substation primary systems projects
  - transmission overhead projects
  - transmission underground projects
  - substation secondary system projects
  - generation secondary system projects
- dealing with unplanned events on at least one 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:

- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings:
    - material lists, conductor size, type and route length

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- constructions types and structures for distribution and sub-transmission lines
- types, sizes and characterises of overhead conductors
- resources for the stringing and maintenance of conductors:
  - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections
  - causes and effects of poor electrical connections
  - reasons for and methods used to maintain standard phase sequencing
  - removing, repairing and replacing damaged conductors
  - minimum clearances between overhead conductors and LV and HV structures
- techniques for conductor installation:
  - types and application of tools, equipment and hardware
  - methods of stringing, tensioning and termination of LV and HV conductors

- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
  - limits of approach for personnel, vehicles, mobile plant and elevating work platforms (EWP)
  - requirements of persons prior to making bare hand contact with dead LV mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
  - safe working practices:
    - requirements to enable safe working on conductive poles and procedures to attach an 'on-site' earthing device to de-energised LV and HV overhead circuits
- installation of poles and or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware:
    - types of installation equipment/tools
    - excavation methods
    - types of footings/foundations
    - types of attachments
    - earthing systems
    - clearances between conductors
    - safe methods of erecting and stabling poles and/or structures and cross-arms
  - techniques for maintenance of poles and associated hardware:
    - stabilisation techniques for unstable poles
    - methods of strengthen poles
    - maintenance and replacement of HV insulators and cross-arms

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- installation of LV electrical services encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - types of LV overhead services
    - methods of construction and installation
    - minimum clearances for overhead services to assets
    - structures and types of installation equipment/tools
  - characteristics and applications of different types of cables:
    - cable cross-sectional area of conductors and current rating and fuse type
  - techniques for maintenance of service installations:
    - diagnosis and repair of faults
  - jointing and terminating methods:
    - polymeric heat shrink materials
    - polymeric tape materials
    - energised and de-energised cables and connections to fuse boxes and pole top boxes
  - testing and commissioning procedures:
    - inspection and polarity
    - voltage and phase sequence tests
  - construction types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors:
    - types of LV and HV overhead electrical conductor connections
    - causes and effects of poor electrical connections
    - reasons for and methods used to maintain standard phase sequencing
    - removing, repairing and replacing damaged conductors
    - minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation:
    - types and application of tools, equipment and hardware
    - methods of stringing, tensioning and termination of LV and HV conductors
- procedures for installation and maintenance on transmission lines, structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - minimum construction clearances for transmission lines and sag/tension requirements
  - construction types and structures used in transmission lines
  - types, sizes and characteristics of transmission conductors:

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    - aluminium conductors
    - steel reinforced and earthing conductors
  - types of electrical connections used to connect transmission conductors:
    - compression termination and bolted termination
  - causes and effects of poor electrical connections
  - types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
  - techniques for stringing, tensioning and terminating transmission conductors
  - techniques for installation of associated hardware used on transmission towers
  - techniques for maintenance of damage transmission conductors:
    - repair and replacement
- procedures for installation and maintenance on public lighting structures and associated equipment encompassing:
  - standards, codes, legislation, supply authority regulations, local government and/or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
  - safety precautions specific to working on street lighting:
    - safe working practices and procedures
    - safe clearances from LV and HV mains
    - working at heights, working in confined spaces, permit to work systems and isolation procedures
    - emergency response and rescue procedures, including first aid
  - basic public lighting principles:
    - electromagnetic spectrum
    - principles of colour
    - behaviour of light
    - factors that affect illumination
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings:
    - street lighting circuits
    - earthing system
  - types of tools and equipment used for installation and maintenance
  - types and function of lanterns/luminaires/lamps, control equipment, poles and associated hardware used for street lighting:
    - high pressure mercury vapour, low pressure and high pressure sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches and contactor boxes
  - types of lighting systems:
    - overhead and underground street lighting systems
    - controlling and switching of lighting systems
  - techniques for the installation of street lighting systems

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- techniques for the maintenance of street lighting systems:
  - diagnosing faults
  - removing, repairing, replacing and cleaning of public lighting and associated hardware
- application of specific testing equipment:
  - voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers and fault indictors
- techniques for the inspection, testing and commissioning of street lighting systems

- different types and function of distribution components encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - types, function and characteristics of distribution components
  - safety policies, procedures and precautions related to handling and installing distribution components
- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
  - application of safe design principles:
    - safe design duty related information, safe design process related information and safe design evaluations
- LV switching principles encompassing:
  - 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
    - LV network interconnectors source of possible back-feed
  - LV switching techniques:
    - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permits, operational procedures and earthing procedures
  - personnel protective equipment (PPE) for LV switching
- HV switching principles encompassing:
  - 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

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        - HV 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 procedures 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 effectiveness of operational earthing
        - acceptable industry procedures and PPE
    - 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 encompassing:
    - primary causes, effects and types of HV electrical faults
    - HV protection devices:
        - main components, types, categories, applications and functions
    - basic principles 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
- implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:
    - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission:
        - Commonwealth/state/territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
    - identification, assessment, control and monitoring of the hazards to the environment associated with the powerline industry
    - workplace environment quality standards enterprise plan:

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        - setting of acceptable emission level limits from power plant equipment
        - impact of the enterprise activities on air and water quality, and nature
        - impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage and insulation breakdown products)
    - provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
    - gathering of environment management information
    - maintenance of environmental records
    - risk assessment and its management in powerline industry
    - maintenance strategies for environment protection programs:
        - developing processes for promoting, maintaining and improving environmental impact in the workplace
        - identifying techniques for evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system
        - Environment Protection Authority (EPA) consultation and accident/incident investigations
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents:
        - wiring and schematic diagrams, drawings and switching symbols
        - mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on LV and HV systems:
        - overhead distribution extensions
        - underground distribution extensions
        - distribution substations
        - street lighting systems
- layout principles for overhead distribution encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
    - methods in determining material, equipment and tool lists:
        - components types and quantity required
        - spacing of components, such as equipment, poles, cross-arms, costings of items and

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components
    - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
    - determination of conductor size, type and route length
    - resources needed for the stringing and maintenance of conductors
    - types of LV and HV overhead electrical conductor connections
    - minimum clearances between overhead conductors and LV and/HV structures
    - estimation of the duration of overhead distribution extension project
- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
    - techniques in measuring heights and distances
    - techniques in taking bearings angles of deviation using a compass
    - techniques in using a clinometer
    - techniques in recording and storage of data
    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - techniques in plotting long spans:
        - measuring stick, clinometer, trundle wheel and tapes
        - correction for sloping ground
        - distance across objects and range rods
    - techniques in pegging pole positions:
        - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- project management encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the duties and responsibilities for management a project
    - analysis of functions of project management to determine achievement of project objectives
    - relationship of stakeholders to the project
    - techniques in development of project plan:
        - project integration, scope, timelines, cost, quality, resources, communication/protocol requirements, risk/uncertainties and procurement and contacting
    - relationship between project processes, project life and project phases
    - planning and control procedures, resource management and risk management
    - techniques, methodologies and tools available to project managers
    - types of internal and external environmental factors that may affect the project.

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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 PPE currently used in industry to manage electrical infrastructure projects
- 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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UETTDRDS42 Investigate quality of power systems supply issues

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 technical investigation of quality of supply issues and recommending solutions. Quality of supply issues may include television and radio interference, voltage complaints, harmonics and system irregularities.

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

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

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy

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management policies & procedures

UETTDRDS35 Design overhead distribution power systems

UETTDRDS36 Design underground distribution power systems

Pathway Unit Group 1

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

Pathway Unit Group 2

UETTDRDS43 Develop high voltage and low voltage distribution protection systems

Competency Field

Design

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 for and coordinate the investigation of issues in the quality of supply	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the investigation of issues in the quality of supply, are reviewed and determined
	1.2 Purpose of the investigation is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the investigation are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures

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	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out and coordinate the investigation of issues in the quality of supply	**2.1**	Circuit/system modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Investigation decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures

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	2.4	Mathematical models of the quality system are used to analyse the effectiveness of the finished product/service in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.9	Testing of supply quality is undertaken according to requirements and established procedures
3 Complete and coordinate the investigation of issues in the quality of supply	**3.1**	Final assessments of the quality of project are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the supply brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of quality assessment documents are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS42A Investigate quality of power systems supply issues.

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 UETTDRDS42 Investigate quality of power systems supply issues

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
- completing six (6) technical solutions to issues relating to the following project types:
  - television and radio interference
  - voltage irregularities in an urban area
  - voltage irregularities in a rural area
  - voltage irregularities affecting an industrial/commercial customer
  - voltage irregularities in an underground area
- 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:

- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters:
    - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes
- detailed operation of field device test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters:

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    - measurement of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices
- quality of supply measures encompassing:
    - measure, analysis and solutions for the following;
    - voltage variation outside of standards
    - voltage sags and swells
    - repeated fluctuations, impulses and momentary interruptions
    - frequency variation and harmonics - causes, effects and methods of minimisation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 to investigate quality of supply issues
- 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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UETTDRDS43 Develop high voltage and low voltage distribution protection 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 the development of appropriate protection systems for high voltage (HV) and low voltage (LV) distribution networks, including calculations of fault levels, selection of appropriate protection devices and automation requirements, and protection coordination schemes. It also includes recommendations to support the calculations and must ensure conformance to specific organisational operational and system planning requirements, and compliance with national or supply authority codes.

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

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

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Design

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 and coordinate for the development of HV and LV protection systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the development of HV and LV protection systems, are reviewed and determined
	1.2 Purpose of the development is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the development are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule

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	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the development of HV and LV protection systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the HV and LV protection systems are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

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	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the development of HV and LV protection systems	**3.1**	Final inspections of the system design are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS43A Develop high voltage and low voltage distribution protection systems.

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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 UETTDRDS43 Develop high voltage and low voltage distribution protection 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
- completing at least two (2) designs from two (2) of the following project types:
  - distribution overhead designs
  - distribution underground designs
  - distribution substation designs
- 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:

- 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 systems
  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles

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- particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- application of safe design principles:
  - safe design duty related information, safe design process related information and safe design evaluations

- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear:
    - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
    - operating characteristics
    - advantages and disadvantages of different types switchgear
    - installation procedures
    - earthing 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
- electrical equipment associated with distribution field device protection and control schemes encompassing:
  - types and applications of electrical equipment:
  - characteristics and capabilities
  - schemes, automatic circuit reclosers (ACRs), gas switches, secondary injection tests, primary injection tests, TMR radio’s, supervisory control and data acquisition (SCADA), remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, direct current (DC) supplies, alternating current (AC) supplies and alarms
- calculation of fault levels encompassing:
  - calculation of fault levels in symmetrical and asymmetrical fault conditions:
    - types of faults
    - interconnected and radial systems
    - symmetrical components
    - representation of voltages and currents

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    - sequence impedances of system plant
    - calculation/determination of sequence impedance networks
    - determination of operative sequence impedances
    - fault or arc impedances
    - first approximation techniques
  - interrupting device capabilities:
    - determination of fault current breaking capability and let through energy capability of fuses and circuit breakers
    - DC offset and transient condition effects
- detailed operation and setting of 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
    - 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
    - backup protection
  - alarms and controls:
    - auxiliary relays
    - voltage regulating relays
    - line drop compensation
    - gas relay types
    - gas relay scheme operation and setting
    - over temperature schemes
- polyphase systems and its application towards the calculation of circuit conditions encompassing:
  - structure of a three phase system:
    - components, sequence of phases and balanced and unbalanced load conditions
  - calculations of phase and line voltages for a specified phase sequence
  - calculation of voltage, current, power, power factor in a three phase system:
    - balanced three phase systems

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    - unbalanced delta connected loads
    - unbalanced four-wire star connected loads
    - unbalanced three-wire star connected loads
    - unbalanced four-wire star connected systems
  - calculation of the neutral displacement voltage in unbalanced three-wire star connected systems
  - selection and connection of meters to confirm calculations
  - control of harmonics:
    - harmonic analysis of non-sinusoidal waves of voltage and current
    - production of harmonics in three phase power systems
    - effects of harmonics on three power systems and loads
    - types of harmonics commonly encountered on three phase power systems
    - identification by observation of harmonic components present in a waveform
  - calculation of effective value of non-sinusoidal waves
  - calculation of current/voltage in a complex load given a voltage/current with a Fourier analysis of up to 3 terms
  - pre-unit system in calculations:
    - reasons for use
    - groups of parameters commonly represented
    - common applications of the per-unit system to represent device specifications
    - applications of per-unit quantities in simple electrical calculations
  - method of symmetrical components:
    - reasons for the use
    - types of components used to represent a three phase system
    - reasons for difference in the impedance of a component to the various symmetrical components and commonly occurring relationships between different sequence impedances for common component groups
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes:
    - reasons for use
    - application of protection zones around system elements and degree of protection
  - types of feeder protection equipment:
    - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of ACRs and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder

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- operation of a single wire earth return (SWER) 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 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 of high voltage (HV) and low voltage (LV) distribution protection systems
- 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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UETTDRDS44 Design power system substations modifications

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 design of modifications within a substation. This may include busbar upgrades, equipment replacement projects and basic secondary upgrades or supervisory control and data acquisition (SCADA) modifications. The design may include civil engineering aspects and must conform to safety regulations and environmental standards and incorporate the principles of safe design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Design

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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 for and coordinate the design of substations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established organisational procedures, policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry

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		out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
2 Carry out and coordinate the design of substations	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate	**3.1**	Final inspections of the design are undertaken to ensure they comply with all requirements and include all

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the design of substations	specifications and documentations needed to complete the design brief
3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS44A Design power system substations modifications.

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 UETTDRDS44 Design power system substations modifications

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
- completing six (6) compliant technical designs of different components of a substation with at least one relating to each of the following project types:
  - primary equipment upgrades or replacements
  - secondary equipment upgrades or replacements
  - supervisory control and data acquisition (SCADA) modifications
- completing designs, including:
  - activities that address the correction of errors in designs
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- electrical computations encompassing:
  - graph functions and applications:
    - linear, non-linear, parabolic, hyperbolic, logarithmic and exponential
  - complex numbers:
    - polar form and rectangular form
  - simultaneous equations
  - quadratic equations
  - phasor diagrams
  - star-delta transformations

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- working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage (ELV), low voltage (LV) and high voltage (HV) hazards and high current hazards encompassing:
  - risk management and assessment of risk:
    - principle and purpose of risk management and processes for conducting a risk assessment
  - hazards associated with LV, 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
  - risks and control measures associated with HV:
    - parts of an electrical system and equipment that operate at HV
    - the 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
  - optical fibre safety:
    - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement
  - risks and control measures associated with LV:
    - risks associated with modifying electrical installations
    - fault finding, maintenance and repair
    - control measures before, during and after working on electrical installations, circuits or equipment
    - isolation and tagging-off procedures
    - risks and restrictions in live work and control measures for live work
  - risks and control measures associated with harmful dusts and airborne contaminants:
    - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials
  - 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
- 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

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- 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

- generation systems encompassing:
  - methods of generating electricity:
    - types of power stations and reasons for their location, layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements:
    - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- substations and power transformers encompassing:
  - relationship between the substations within an overall power system:
    - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer:
    - basic construction of distribution transformers
    - operation under load/no-load conditions
    - types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers:
    - function and basic operation
  - maintenance of a power transformer:
    - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
  - characteristics of a reactors:
    - description and purpose
- safe working on energised LV equipment encompassing:
  - 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 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
  - release and rescue procedures for work on or near exposed energised LV conductors

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- installation of metering and control equipment encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
  - types of meters:
    - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
  - installation and removal methods:
    - direct connection and plug in method
    - enterprise specific
  - types of associated equipment and accessories:
    - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
  - testing procedures:
    - safety testing and polarity testing
- principles of statutory and safety considerations encompassing
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment:
    - characteristics and capabilities
    - schemes, overcurrent, frame leakage, cooling, buchholz, direct current (DC) supplies, restricted earth, sensitive earth fault, circuit breaker (CB) fail, reclose, DC frame leakage, CEL fail, under frequency load shed and earth fault
- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
  - application of safe design principles:
    - safe design duty related information, safe design process related information and safe design evaluations
- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear:
    - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
    - operating characteristics
    - advantages and disadvantages of different types switchgear
    - installation procedures

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    - earthing 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
- environmental fundamentals encompassing:
  - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the control of environment associated with the worksite:
    - relevant federal, state/territory legislation, local government by-laws, government or quasi government policies and regulations and community planning and development agreements -(land care agreements)
  - employer and employee responsibilities
  - methods of obtaining information on environmental issues and updates
  - methods of identifying environmental impacts from work-related activities
  - meaning of environmental terms:
    - identification, assessment and control of risks
    - compliance, best practice and sustainable energy
  - procedures in implementing management plans to ensure compliance
- environmental fundamentals encompassing:
  - 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 to environmental care when handling materials, including provision of manufacturers 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 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

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- methods of cleaning mobile plant, equipment and tools
- recording of data

- substation safety practices encompassing:
  - 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 WHS/OHS requirements associated with the use of EWP
  - control of small fires:
    - the 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:
    - the identification, use and maintenance of spill oil control equipment and materials, oil containment facilities and systems
  - rescue and release procedures:
    - the rescue personnel from energised conductors
    - emergency descent from an EWP
    - 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
- design principles of HV insulation systems encompassing:
  - insulation design principles:
    - common materials used
    - electrical characteristics
    - thermal characteristics

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    - uses and applications to substation HV plant and equipment
    - grading, construction and cooling
  - common contaminants and their effects:
    - internal contaminants and external contaminants
  - testing and measurement of insulation quality:
    - test types and common measuring instruments and techniques
    - resistance and resistivity, losses, measurement errors, temperature corrections and safe work practices related to testing and measurement
  - safety precautions when testing and measuring HV insulation systems:
    - safe working practices and procedures
    - identification of hazards
    - assessment and control of WHS/OHS risks and types
    - selection, maintenance and use of PPE
- principles to design zone substation modifications encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the zone substation design principles
  - requirements for the use of zone substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types of designs:
    - substation modification design, including replacement of one item or a small quantity of items of primary plant, secondary equipment or SCADA equipment
    - full or partial retrofit of SCADA into an existing substation
  - types of zone substation primary plant:
    - HV circuit breakers, reclosers, power, current or voltage transformers, disconnectors, surge arrestors, busbars, busbar supports, load control and frequency injection facilities
  - types of secondary equipment:
    - batteries, battery chargers, protection relays and control devices or panels
  - types of SCADA modification:
    - full or part implementation of SCADA retrofits
    - replacement of SCADA IEDs, remote terminal units (RTU) and SMUs.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles 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 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 to undertake design of a substation
- 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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UETTDRDS45 Organise and implement ESI line and easement surveys

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 surveying of distribution and sub-transmission lines and easements for activities associated with the design and installation of electrical equipment. This activity encompasses the use of instruments, such as compasses, inclinometer and distance measuring devices, and be in accordance with customer requirements, nominated design specifications and company processes.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 and coordinate the organisation and implementation of line and easement surveys	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the organisation and implementation of line and easement surveys, are reviewed and determined
	1.2 Purpose of the line and easement surveys is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personnel protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

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		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out and coordinate the organisation and implementation of line and easement surveys	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Survey project decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

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		specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.9	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
3 Complete and coordinate the organisation and implementation of line and easement surveys	**3.1**	Final assessment of the surveys is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of survey documents are issued and records are updated 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 UETTDRDS45A Organise and implement ESI line and easement surveys.

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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 UETTDRDS45 Organise and implement ESI line and easement surveys

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
- completing six (6) surveys of an overhead network relating to the following project types:
  - multi-pole extensions (distribution and sub-transmission)
  - in-line pole relocations (distribution and sub-transmission)
  - multi-circuit overhead lines (distribution and sub-transmission)
  - underground augmentation project
- completing designs, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- fundamentals of surveying for the purpose of producing an overhead or underground distribution extension encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements applicable to the surveying for an overhead and underground extension
  - techniques in measuring heights and distances
  - techniques in taking bearings angles of deviation using a compass
  - techniques in using a clinometer
  - techniques in recording and storage of data

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    - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
    - techniques in plotting long spans:
        - measuring stick, clinometer, trundle wheel and tapes
        - correction for sloping ground
        - distance across objects and range rods
    - techniques in pegging pole positions:
        - foot path alignments, types of pegs, pegs of other authorities and locating survey pegs
- project management encompassing:
    - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the duties and responsibilities for management of a project
    - analysis functions of project management to determine achievement of project objectives
    - relationship of stakeholders to the project
    - techniques in development of project plan:
        - project integration, scope, timelines, cost, quality, resources, communication/protocol requirements, risk/uncertainties and procurement and contacting
    - relationship between project processes, project life and project phases
    - planning and control procedures, resource management and risk management
    - techniques, methodologies and tools available to project managers
    - types of internal and external environmental factors that may affect the project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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.

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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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UETTDRDS46 Develop planned power systems outage strategies

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 competency required to assess and manage the impact on the network and customers with regards to planned outages. This includes customer outage times, network and plant loading issues and regulatory requirements. A detailed knowledge of network performance indicators is required.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEED104A Use engineering applications software on personal computers

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

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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 and coordinate the development of outage strategies	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the outage strategies, are reviewed and determined
	1.2 Purpose of the outage is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the outage are obtained or established with appropriate personnel
	1.4 Equipment/tools and personnel protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised,

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		where applicable, in accordance with established procedures
2 Carry out and coordinate the development of outage strategies	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the strategy in accordance with requirements and/or established procedures
	2.3	Strategy decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the outage strategies are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the strategy within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the development of outage strategies	**3.1**	Final review of the strategy is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised

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3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of outage strategy documents are issued and records are updated 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 UETTDRDS46A Develop planned power systems outage strategies.

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 UETTDRDS46 Develop planned power systems outage strategies

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
- writing three (3) outage strategies, including at least one (1) of each of the following network types:
  - low voltage (LV) networks
  - high voltage (HV) networks
- each of the above outage strategies must include the following:
  - switching instructions laid out according to enterprise requirements
  - a documented process to indicate methods used to check switching instructions
  - documentation of coordination process of switching schedules
  - documentation of plant loading calculation
  - initiation of customer notifications according to enterprise requirements
  - entry of data for collection of ‘minute of supply’ records into relevant systems
- 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:

- working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage (ELV), LV and HV hazards and high current hazards encompassing:
  - risk management and assessment of risk:
    - principle and purpose of risk management and processes for conducting a risk assessment
  - hazards associated with LV, ELV and high currents

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- 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
- risks and control measures associated with HV:
  - parts of an electrical system 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
- optical fibre safety:
  - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement
- risks and control measures associated with LV:
  - risks associated with modifying electrical installations, fault finding, maintenance and repair
  - control measures before, during and after working on electrical installations, circuits or equipment
  - isolation and tagging-off procedures
  - risks and restrictions in live work and control measures for live work
- risks and control measures associated with harmful dusts and airborne contaminants:
  - thermal insulation, fibrous cement materials and asbestos and other fibre reinforced switchboard materials
- 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
- 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
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and c-ordination:
    - clear and concise instructions and information

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    - methods for the encouragement of feedback and contributions of information and ideas
    - responsibilities of members of the team
  - techniques in analysing, planning, coordination and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites:
    - electrical network diagrams for the specific worksite
    - earth access authorities
    - safe working area
    - work to be carried out in confined space or in hazardous environment
    - specific outsourcing procedures
    - specific hazard identification, risk classification and management procedures
    - regulatory requirements, such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits:
    - working in confined space, if required
    - coordination of access authorities
    - engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
  - application of safe design principles:
    - safe design duty related information, safe design process related information and safe design evaluations
- installation of switchgear and associated equipment encompassing:
  - types and function of various switchgear:
    - isolators, air-break switches, gas-filled switches, vacuum type, links, fuses, oil disconnectors, fuse switches and circuit breakers
    - operating characteristics
    - advantages and disadvantages of different types switchgear
    - installation procedures

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        - earthing 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
- LV switching principles encompassing:
    - 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
        - 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, earthing procedures and personnel protective equipment (PPE) for LV switching
- HV switching principles encompassing:
    - 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
        - HV 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, 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

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- 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 effectiveness of operational earthing
  - acceptable industry procedures and personal protective equipment (PPE)
- 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

- HV overhead and substation switching principles encompassing:
  - legislation, standards, codes, legislation, 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 and 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 and 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
    - phasing tester

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- operation of protection systems and substation equipment:
  - fault levels and settings
  - types and applications
  - protection systems and substation equipment fault levels and settings
  - 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
  - HV switching techniques
- operate switching apparatus:
  - identifying hazards, assessing and controlling risks associated with HV switchgear operation
  - systematic and defensive techniques
  - mobile radio procedures
  - 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 to develop planned outage strategies
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UETTDRDS47 Review power system asset management strategies

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 management of assets within the transmission, sub-transmission and distribution networks. This includes plant optimisation, condition monitoring, maintenance strategies and policies and capital works planning, including recommendations for continual improvement. Cost-benefit analysis is fundamental for successful implementation of the aforementioned asset management functions.

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

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

UEENEEE104A Solve problems in d.c. circuits

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Testing Pathway Unit Group

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UEENEED104A Use engineering applications software on personal computers

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS22 Commission interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS35 Maintain complex network protection and control systems

Design Pathway Unit Group

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

Competency Field

Design

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 for and coordinate the review and implementation of asset management systems	**1.1** Work health and safety (WHS/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence asset management systems, are reviewed and determined
	1.2 Purpose of the project is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established

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		with appropriate personnel
	1.4	Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the review and implementation of asset management systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in

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		accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the review and implementation of asset management systems	**3.1**	Final review of the project is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the project brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of documents are issued and records are updated 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRDS47A Review power system asset management strategies.

Links

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Assessment Requirements for UETTDRDS47 Review power system asset management strategies

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
- correctly interpreting three (3) existing maintenance strategies or policies that relate to electrical network components of the following types:
  - lines
  - substation primary plant
  - substation secondary equipment
  - public lighting
- preparing three (3) maintenance strategies or policies that relate to electrical network components of the following types:
  - lines
  - substation primary plant
  - substation secondary equipment
  - public lighting
- 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:

- principles of safe design encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
  - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
  - application of safe design principles - safe design duty related information, safe design

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process related information and safe design evaluations

- enterprise-specific data management processes encompassing:
  - 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 the enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- effective management and communication encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
  - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures and anti-discrimination policies and procedures
  - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management and range of support services and expertise available
  - techniques in managing relationships - identifying problems and methods of conflict resolution, methods of consultation, communication, negotiation and mentoring, and strategies for positive feedback
  - techniques in leadership in achieving enterprise strategic and operational plans
  - techniques in managing relationships under stress - stress management
- methodology used in writing enterprise-specific management reports encompassing:
  - Commonwealth, state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the writing enterprise-specific management reports
  - techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems and storing and retrieving data from computer systems
  - relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace WHS/OHS and risk management, enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
- power distribution network documentation encompassing:

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  - requirements for the use of manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
  - interpretation of different diagrams and documentation on low voltage (LV) and high voltage (HV) systems - overhead distribution extensions, underground distribution extensions, distribution substations and street lighting systems
- layout principles for overhead distribution encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to overhead distribution layout
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists - components types and quantity required, spacing of components such as equipment, poles, cross-arms, and costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
- determination of conductor size, type and route length encompassing:
  - resources needed for the stringing and maintenance of conductors
  - types of low LV and HV overhead electrical conductor connections
  - minimum clearances between overhead conductors and low LV and/HV structures
  - estimation of the duration of overhead distribution extension project.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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equipment (PPE) currently used in industry to perform a review of asset management strategies
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UETTDRDS48 Analyse and appraise power system fault and outage data

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 data gathering and analysis of system outages and plant failures. It includes recommending solutions and maintenance plans to ensure system security.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 for and coordinate the analysis and appraisal of fault and outage data	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the analysis and appraisal of fault and outage data, are reviewed and determined
	1.2 Purpose of the analysis/appraisal is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

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		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out and coordinate the analysis and appraisal of fault and outage data	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Analysis/appraisal decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of solutions for system outages and plant failures are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

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	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the analysis and appraisal of fault and outage data	**3.1**	Final inspections of the analysis/appraisal are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of documents are issued and records are updated 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 UETTDRDS48A Analyse and appraise power system fault and outage data.

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 UETTDRDS48 Analyse and appraise power system fault and outage data

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
- writing reports relating to each of the following, recommending relevant actions:
  - zone substation faults
  - distribution feeder faults
  - distribution substation faults
- 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:

- principles of high voltage (HV) encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on or near HV
  - electrical and electrostatic principles related to high voltage lines - relationship of current, voltage and resistance as related to transmission lines and relationship of phase voltage and respective line voltages, and production of an electric field encompassing:
    - units, effect of distance, potential of an object within the field and the effect of distances to the potential
  - HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, performance of a failed disc insulator on the line and the system, determining the minimum allowable number of discs per string for each line voltage in the system before bare-hand work is to proceed, techniques in detecting a failed disc in a string, techniques in using appropriate tools and equipment to test a string and methods of recording data

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- effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field and effects of electrostatic induction on bare-hand work
- application of Faraday's cage - effects of a body, advantages and description of the Faraday's cage used by bare-hand live-line workers
- safety precautions working on or near HV electrical apparatus - safe approach distances from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised live working equipment; safe working policies, procedures and practices when using and operating specialised equipment; methods of using specialised equipment and emergency response and rescue, including first aid
- effects of lighting and switching surges on performance of string insulators - health effects to workers and methods used to alleviate surges on transmission lines
- magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields

- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment encompassing characteristics and capabilities - schemes, overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker (CB) fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault
- installation of switchgear and associated equipment encompassing:
  - 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, and earthing 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 encompassing:
  - 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 permits, operational procedures and

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earthing procedures
    - personnel protective equipment (PPE) for LV switching
- HV switching principles encompassing:
    - 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, 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 effectiveness of operational earthing, acceptable industry procedures and (PPE
    - 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 encompassing:
    - 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 encompassing:
    - 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

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elbows, switching cubicles, canister fuses, bayonet fuses, F and G switching cubicles, voltage indicators and phasing testers

- feeder automation system encompassing:
  - 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
- methodology in analysing network event records encompassing:
  - Commonwealth, state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the analysis of critical events
  - requirements for the use of critical event data, manuals, system diagrams/plans and drawings
  - sources of critical event data
  - analysis and assessment of network event records and relevant data- the use of event records and data to analyse and develop optimal network restoration strategies taking into account public and employee safety, enterprise reliability guidelines and resource availability
  - safety policies, procedures and precautions related to critical events - WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; checking integrity of the system for minimum disruption; effective communication methods and chain of command; and emergency response and rescue, including first aid 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.

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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 PPE currently used in industry to perform analysis and appraisal of fault and outage data
- 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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UETTDRDS49 Establish and manage power system geographical information systems data

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 preparation and updating of detailed plans to be used during the construction phase of all design activities, and utilised by network owners as technical reference materials, to detail system infrastructure. It includes the use of geographical information systems (GIS).

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEED104A Use engineering applications software on personal computers

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational OHS policies, procedures and programs

Competency Field

Design

Unit Sector

Not applicable.

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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 and coordinate the establishment and management of GIS data	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the establishment and management of GIS, are reviewed and determined
	1.2 Purpose of the GIS is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the GIS are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and

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		respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the establishment and management of GIS data	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Decisions concerning the establishment and management of GIS are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the establishment and management of GIS are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the establishment and management of GIS data	**3.1**	Final review of the establishment and management processes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and

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reports and/or completion documents are finalised

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of documents regarding the establishment and management process are issued and records are updated 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 UETTDRDS49A Establish and manage power system geographical information systems data.

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 UETTDRDS49 Establish and manage power system geographical information systems data

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
- completing geographical information systems (GIS) records relating to six (6) distribution or sub-transmission network relating to the following project types:
  - overhead extensions (distribution or sub-transmission)
  - underground extensions (distribution or sub-transmission)
  - substation construction (distribution or sub-transmission)
- completing projects including:
  - any preparation and updating of detailed construction drawings of distribution and sub transmission networks
  - the use of a GIS
- 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:

- drawings, diagrams and schedules used in electrotechnology work encompassing:
  - drawing types and applications: drawing layouts and conventions - mechanical drawings, electrical/electronic schematics, wiring diagrams, PC boards, location diagrams (architectural drawings), cable routes and switching arrangements, and building details
  - drawing symbols - symbols representing electrotechnology circuit components, equipment location, and cable routes and control arrangements
  - cable/wiring/connection and equipment/component/schedules
- working safely on or around electrical equipment through the application of risk management principles and control measures for dealing with non-electrical hazards and extra-low voltage (ELV), low voltage (LV) and high voltage (HV) hazards and high current hazards

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encompassing:

- risk management and assessment of risk - principle and purpose of risk management and processes for conducting a risk assessment
- hazards associated with LV, 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 and parts of an electrical system and equipment where high currents are likely
- risks and control measures associated with HV - parts of an electrical system and equipment that operate at HV; the 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
- optical fibre safety - coherent optical sources and joining procedures and laser safety class 3a devices or their replacement
- risks and control measures associated with LV - risks associated with modifying electrical installations; fault finding, maintenance and repair; control measures before, during and after working on electrical installations; circuits or equipment; isolation and tagging-off procedures; risks and restrictions in live work and control measures for live work
- risks and control measures associated with harmful dusts and airborne contaminants: - thermal insulation, fibrous cement materials and asbestos, and other fibre reinforced switchboard materials
- safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device, and checks and storage methods for maintaining the safety of testing devices

- 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
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors - types of LV and HV overhead

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electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; minimum clearances between overhead conductors and LV and HV structures
    - techniques for conductor installation - types and application of tools, equipment and hardware; and methods of stringing, tensioning and termination of LV and HV conductors
- electrical equipment fundamentals used in the powerline industry encompassing:
    - legislation, standards, codes, legislation, supply authority regulations, and specific enterprise regulations pertaining to the use and care of electrical equipment
    - electrical equipment will vary according to the enterprise but encompass both HV and LV equipment
    - characteristics, capabilities and application of powerline electrical equipment
    - safety precautions with regards to using electrical equipment
    - techniques in pre-use inspection on the serviceability of electrical equipment
    - techniques in the general maintenance, care and storage of electrical equipment
    - identifying hazards, assessing and controlling risks associated with the use of electrical equipment
- principles of safe design encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with safe design principles
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
    - application of safe design principles - safe design duty related information, safe design process related information and safe design evaluations
- enterprise-specific switching diagrams and drawing encompassing:
    - 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 catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific data management processes encompassing:
    - 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 the enterprise-specific procedures
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure

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- procedures for the location and rectification of faults in electrical equipment up to 1000 volts alternating current (a.c.) and or 1500 volts d.c. encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - Acts and regulations, identification of personal safety and workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation and enterprise policies and procedures
  - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment and fault-finding techniques and procedures
  - fundamental electrical concepts - effects of current, practical resistors, sources of electromagnetic field (EMF); series, parallel and series-parallel circuits; electrical measurement, capacitors, inductors and magnetism
  - fundamentals of general appliances - basic principles of appliances (non-mathematical); appliance identification; appliance ratings; basic principles of operation of control equipment and protection devices; fault conditions and symptoms; safe isolation procedures; test equipment; safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
  - fundamentals of single phase induction motors - basic principles of operation (non-mathematical); motor identification; motor ratings; basic principles of operation of control equipment and protection devices; fault conditions and symptoms; safe isolation procedures; test equipment; safe testing procedures, including continuity, fault types in phase splitting and universal type motors, and fault-finding procedures (prescriptive)
  - fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
  - fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedure and fault-finding procedures (prescriptive)
- GIS principles encompassing:
  - standards, codes, supply authority regulations and/or enterprise requirements associated with the use of geographic information systems
  - requirements for the use of system manuals, system diagrams/plans and drawings
  - techniques in system use - system structure, preparation of data, methods of data entry, methods of accessing data, linking to other databases and output options.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles 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 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 to undertake establishment and management of GIS data
- 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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UETTDRDS50 Design customer power system substations

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 design of basic primary and secondary plant within a customer substation. Such designs will usually include relay-operated high voltage (HV) switchgear, distribution transformers, low voltage (LV) switchgear, including customer distribution boards. The design may include minor civil engineering aspects and must conform to relevant Australian Standards, safety regulations, environmental standards and customer requirements taking into account costs as an important criterion.

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

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Pathway Unit Group 1

UEENEEE104A Solve problems in d.c. circuits

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

Pathway Unit Group 2

UEENEEE104A Solve problems in d.c. circuits

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDRDS43 Develop high voltage and low voltage distribution protection systems

Pathway Unit Group 3

UETTDRDS44 Design power system substations modifications

Competency Field

Design

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 for and coordinate the design of customer substations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of customer substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel

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	1.3	Organisational established procedures on policies and specifications for the design are obtained or established with appropriate personnel
	1.4	Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the design of customer substations	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Substation design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the customer substation are

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		used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given to potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of customer substations	**3.1**	Final inspections of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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

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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 UETTDRDS50A Design customer power system substations.

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 UETTDRDS50 Design customer power system substations

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
- completing six (6) designs in total drawn from at least two (2) of the following project types:
  - single transformer substations
  - multi-transformer substations
  - upgrade/alteration to existing assets
  - auto-changeover systems
- 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:

- substations and power transformers encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of high voltage (HV) equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
  - characteristics of reactors - description and purpose
- installation of metering and control equipment encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment

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  - types of meters - kilowatt-hour meters, single and polyphase, demand meters, recording meters and electronic recording metering system summators
  - installation and removal methods - direct connection and plug in method, and enterprise specific
  - types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
  - testing procedures - safety and polarity testing
- HV distribution transformer principles encompassing:
  - 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
- feeder automation system encompassing:
  - 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
- layout principles for a distribution substation minor upgrade encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to a distribution substation minor upgrade
  - requirements for the use of distribution substation minor upgrade construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, and costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length

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- resources needed for the laying of conductors, cables and equipment
- determining the appropriate installation sequence
- minimum clearances between conductors and equipment
- estimation of the duration of underground distribution extension project

- fundamentals of distribution transformers encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the safe operation and testing of distribution transformers and auxiliary equipment
  - drawing layouts, conventions and symbols - vector group of transformers and three phase transformers
  - construction of a distribution transformer
  - characteristics when operated under load and no-load conditions
  - percentage impedance determinations by test and calculation
  - function and operation of tap charging switches, including solid state tap changing equipment
  - function and operation of transformer auxiliary equipment
  - problems caused by harmonics in transformers
  - methods and equipment used to overcome harmonics in transformers
- testing procedures of distribution transformers encompassing:
  - safety precautions specific to the testing of distribution transformers
  - procedures for safely connecting distribution transformers for testing
  - testing of distribution transformers to determine losses
  - calculation of transformer efficiency
  - methods and types of equipment used to cool transformers - properties of transformer oil and tests performed on transformer oil
  - techniques in performing selected tests on transformer oil
  - techniques in performing testing procedures on armer
  - techniques in testing distribution transformers
  - distribution transformer parallel connections - conditions and restrictions for parallel operations and calculations of loading on transformers operating in parallel
  - connection of transformer in parallel to supply a common load.

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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 to design customer substations
- 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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UETTDRDS51 Manage power system transmission and sub-transmission design process

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 management of transmission, sub-transmission and zone substation design process activities. It applies to all design projects whether they be basic secondary upgrades, supervisory control and data acquisition (SCADA) modifications or new installations on green field sites. The design and management must conform to safety regulations and environmental standards and incorporate the principles of safe design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 for and coordinate the management of the transmission, sub-transmission and zone substation design process	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

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		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the management of the transmission, sub-transmission and zone substation design process	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

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	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the management of the transmission, sub-transmission and zone substation design process	**3.1**	Final checks of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS51A Manage power system transmission and sub-transmission design process.

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 UETTDRDS51 Manage power system transmission and sub-transmission design process

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
- conducting design process commencement activities, including each of the following items:
  - completion of site survey
  - geotechnical and resistivity details
  - completion of environmental considerations
  - acquisition of design project scope document
  - component manufacturer details
  - engagement of necessary consultants/contractors
- conducting design process completion activities, including each of the following items:
  - issue of design documentation to allow construction
  - closure of the design process post-delivery review and implementation of corrective actions
  - issue of corrected design documents reflecting field mark-ups
- conducting two (2) technical projects, including:
  - activities that address the correction of errors in the process
  - application of a design control checklist, which lists all of the required design activities to be carried out in this process
- 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:

- working safely on or around electronic equipment encompassing:
  - risk management and assessment of risk - principle and purpose of risk management and

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processes for conducting a risk assessment
    - 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 and 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 used - '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
    - risks and control measures associated with LV - risks associated with installation, fault finding, maintenance and repair; control measures before, during and after working on electronic systems or equipment; isolation and tagging procedures; risks and restrictions in live work and control measures for live work
    - risks and control measures associated with the high levels of radiation - radio frequency (RF) hazards, maximum exposure levels to RF and maximum exposure to microwave radiation
    - optical fibre safety - coherent optical sources and joining procedures, and laser safety class 3a devices or their replacement
    - safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, chemical cleaning solvents, glues and joining wastes used in electronics, safe use of electrical testing device, and checks and storage methods for maintaining the safety of testing devices
- enterprise-specific equipment installation procedures encompassing:
    - 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 personal protective equipment (PPE); responsibilities and protocols and safe working clearances
    - remote and local operating principles and conventions
- enterprise-specific data management processes encompassing:
    - 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

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  - techniques in using the data management systems in following necessary commands and protocols in accordance with the enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- enterprise-specific procedures and work practices relating to critical events encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to critical events
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise operating procedures
  - techniques in the applying enterprise operating procedures
- effective management and communication encompassing:
  - Commonwealth/ state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
  - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences and provisions relating to WHS/OHS issue resolution
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, and range of support services and expertise available
  - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication and negotiation; and mentoring and strategies for positive feedback
  - techniques in leadership in achieving enterprise strategic and operational plans
  - techniques in managing relationships under stress - stress management
- methodology used in writing enterprise-specific management reports encompassing:
  - Commonwealth, state/territory and local government legislation, supply authority regulations standards, codes and/or enterprise requirements applicable to writing enterprise-specific management reports
  - techniques in researching, collating and analysing information for the report - recording, filing and retrieving systems; and storing and retrieving data from computer systems
  - relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace WHS/OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - techniques in writing enterprise-specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas, and

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compliance and legislative requirements to produce effective reports in the appropriate format

- enterprise-specific procedures and work practices relating to managing critical events encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the procedures and work practices relating to managing critical events
  - requirements for the use of critical event manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise critical event management procedures
  - techniques in applying enterprise critical event management procedures
- procedure to undertake a visual inspection of a scheme encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
  - requirements for the use of manuals, system diagrams/plans and drawings
  - deficiencies in operating to the standard functionality
  - techniques in determining relay malfunction - targeting and techniques in determining wiring defects
- types, uses and techniques when using the tools and equipment associated with substations encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the use of HV or high current test equipment associated with substations
  - safety precautions when using tools and equipment on substations - safe operation procedures; 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; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
  - techniques in the use of tools and equipment associated with substations – recorders, oscilloscopes, real time recorders, storage recorders, data loggers and chart recorders
  - measurements - harmonics, transient capture and point-on-wave assessment and insulation test instruments (digital, analogue instruments up to 5 kV direct current (d.c.) and 10 kV alternating current (a.c.)), techniques including guarding and shielding, measurements of polarisation index, step voltage methods with appropriate temperature correction, dielectric dissipation factor on grounded and ungrounded objects
  - meters and the techniques used to carry out measurements - temperature, winding resistance, conductor resistance, capacitance and inductance, phase angle, frequency, ratio and phase shift and vector group
  - timing measurement tools - sequence timers, event timers and contact timers; measurements on circuit breakers and other interrupter types, such as close-open, open-close, close-open-close, open-close-open sequences
  - equipment used - chain blocks, tension devices, power hand tools, slings and hoists, hydraulic crimping tools, elevated work platforms (EWPs) and other mobile plant used to gain access to work at heights, appropriate hand tools and other mechanical instruments, such as:
    - oscilloscopes, real time recorders, storage recorders, data loggers and chart recorders.

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Measurements may include harmonics, transient capture and point-on-wave assessment

- negotiation techniques encompassing:
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, and range of support services and expertise available
  - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication, negotiation and mentoring; and strategies for positive feedback
  - techniques in client interaction - relationships between client and enterprise, outcomes of the interaction and methods of achieving outcomes
- preparation of policies and procedures encompassing:
  - Commonwealth, state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the preparation of policies and procedures
  - types of standard forms, documentation and data
  - techniques in disseminating policies and procedures
  - techniques in undertaking approval processes
- principles to manage the process of transmission, sub-transmission and zone substation designs encompassing:
  - Commonwealth, state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the substation design management principles
  - requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - type of design management - design commencement, carrying out and completion activities
  - types of design process commencement activities - acquisition of site survey, acquisition of geotechnical and resistivity details, completion of environmental considerations, acquisition of design project scope documents, component manufacturer details and engagement of necessary consultants/contractors
  - types of design carrying out activities - completion of checklists, sign-off checklists and general design administration/housekeeping activities
  - types of design process completion activities - the issue of design documentation to allow construction, closure of the design process, carrying out of the post-delivery review and implementation of corrective actions, issue of corrected design documents reflecting field mark-ups.

Assessment Conditions

Assessors must hold credentials specified within the Standards 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 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 to undertake management of the transmission, sub-transmission and zone substation design process
- 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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UETTDRDS52 Design power system transmission, sub-transmission and zone substation buildings

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 design of transmission, sub-transmission and zone substation buildings. It includes basic augmentations or new installations on green field sites. The design must conform to safety and building regulations and environmental standards and incorporate the principles of safe design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS44 Design power system substations modifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 for and coordinate the design of transmission, sub-transmission and zone substation buildings	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations buildings, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

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		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the design of transmission, sub-transmission and zone substation buildings	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and

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		actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of transmission, sub-transmission and zone substation buildings	**3.1**	Final checks of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS52A Design power system transmission, sub-transmission and zone substation buildings.

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 UETTDRDS52 Design power system transmission, sub-transmission and zone substation buildings

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
- completing two (2) compliant technical designs, including each of the following:
  - establishment of equipment dimensions, weights and dynamic loadings
  - suitability of building room/compartments and door opening dimensions for the equipment to be housed
  - compliance with security, fire rating and safety, pressure relief, Building Code of Australia (BCA) and BA requirements
  - compliance with electrical requirements, i.e. frame leakage and earthed metal isolation
  - appropriateness of floor reference levels
  - provision of cable supports, penetrations and pulling ring requirements
  - building light and power design and drafting
- completing designs, including all the following:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- electrical power circuit analysis encompassing:
  - superposition theorem
  - Kirchhoff‘s laws

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  - mesh analysis
  - Thevenin‘s and Norton‘s theorems
  - maximum power transfer theorem
  - complex impedance
  - frequency domain
  - transients
- identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque, and pressure encompassing:
  - applications of the International System of Units (SI) units
  - the relationship between work, power and energy
  - behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces, and determining the sag in a catenary conductor and the force applied at each end
  - fundamentals of the basic laws of fluid mechanics
- principles to light design layout encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to light design principles
  - requirements for the use of street lighting system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types of tariffs and charges
  - types of street lighting components - column types, foundations, brackets, luminaries and mounting heights
  - types of electrical street lighting circuits - types of supply, lighting circuit and control circuit
  - fundamentals of lighting production - electromagnetic spectrum, visible and non-visible radiation, spectral energy distribution, infra-red, ultra-violet (UV), radiation-safety, incandescence and phosphorescence, reflection and refraction
  - fundamentals of lighting concepts - terms and units, and purpose of reflectors and diffusers
  - factors affecting external lighting design
  - calculation of light output
  - determining illuminance - point to point method and lumen method
  - determining rated life of luminaries
  - fundamentals of street lighting design
  - considerations for special lighting situations - security lighting, hazardous street locations and emergency lighting
- layout principles for underground mains distribution extension encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
  - requirements for the use of underground mains construction manuals, system

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diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, and costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the laying of conductors
  - determining the appropriate excavation for the location
  - determining the size and depth of excavation
  - determining the trench and pit layout procedures
  - minimum clearances between conductors
  - estimation of the duration of underground distribution extension project
- principles of transmission, sub-transmission and zone substation building designs encompassing
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the substation design management principles
  - requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types of building designs - fixed and/or portable control, switchgear, frequency injection and miscellaneous building designs
  - types of building floor construction - concrete poured in situ, pre-cast, elevated ultra-floor beams with poured in situ slab, and pre-manufactured steel framed floor
  - types of building walls construction - steel framed, masonry, pre-cast tilt-up, steel framed and lined
  - types of roof construction - steel framed and sheet steel clad
  - parameters to be considered - establishment of equipment dimensions, weights and dynamic loadings; suitability of building room/compartments and door opening dimensions for the equipment to be housed; compliance with security, fire rating and safety; pressure relief; BCA and BA requirements; and compliance with electrical requirements, i.e. frame leakage, earthed metal isolation, appropriateness of floor reference levels, provision of cable supports, penetrations and pulling ring requirements, building light and power design and drafting.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must 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 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 to undertake design of transmission, sub-transmission and zone substation buildings
- 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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UETTDRDS53 Design power system transmission and sub-transmission substation primary plant

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 design of transmission, sub-transmission and zone substation primary plant. It includes busbar upgrades, equipment replacement projects or new installations on green field sites. The design must conform to safety regulations and environmental standards and incorporate the principles of safe design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS44 Design power system substations modifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 for and coordinate the design of transmission, sub-transmission and zone substation primary plant	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of primary plant component of substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

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		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the design of transmission, sub-transmission and zone substation primary plant	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to avoid incidence and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the design are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and

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		associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of transmission, sub-transmission and zone substation primary plant	**3.1**	Final checks of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS53A Design power system transmission and sub-transmission substation primary plant.

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 UETTDRDS53 Design power system transmission and sub-transmission substation primary plant

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
- completing two (2) compliant technical designs, including each of the following:
  - electrical equipment in accordance with the single line diagram
  - bay spacing, busbar heights, statutory and maintenance clearances in accordance with AS 2067:2016 Substations and high voltage installations exceeding kV a.c. and organisational requirements
  - switchyard equipment layout
  - lightning protection
  - control and power cables routes within and outside switchyard
- completing designs, including all the following:
  - activities that address the correction of errors in the process
  - application of a design control checklist, which lists all of the required design activities to be carried out in this process
- 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:

- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers

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- principles of power transformer construction and operations encompassing:
  - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types
  - reactor types - shunt and series, applications and design considerations
  - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
  - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
  - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
  - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
  - nameplate details - basic impulse insulation (BIL), tapping winding detail, physical layout, cooling ratings and physical details
  - transformer and reactor cooling types and their effects on design and rating
  - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
  - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
  - operating constraints as single units and in parallel
  - tapping windings - placement issues, tapping range and on-load tap changer (OLTC) versus off load tap changer (TC) techniques - high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types
  - control system characteristics
  - high voltage (HV) bushing selection - insulation system used, rating, BIL, selection criteria and testing considerations
- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in HV networks, including voltage control, 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 and types; selection, maintenance and use of personal protective equipment (PPE)
- principles of power transformer high speed OLTC encompassing:

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  - selector types and applications for HV power transformers
  - diverter switch types and applications for HV power transformers, including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag and pennant cycle
  - ratings and construction principles
  - operating mechanism types, stored energy systems and associated control systems
  - operating principles and operating sequences of selectors and diverters
  - measurement requirements, including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
  - online diagnostic tools and devices
  - ancillary equipment, including online filters, over pressure relays and devices
  - testing requirements, including cycle timing, differential delay, energy accumulator mechanical and operational tests, and control system functional tests
  - safety precautions when testing and maintaining HV power transformer OLTC - safe working practices and procedures; identification of hazards and assessment; control of WHS/OHS risks and types; selection, maintenance and use of PPE
- substation switching practices encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to substation switching
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, and identifying switching resources
  - techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and commissioning procedures
  - use, care and operation of equipment associated with HV substation equipment - test instruments and sticks
  - HV switchgear - types, categories, application and operating capabilities
  - basic operation of protection systems
  - restrictions pertaining to HV substation switching equipment
  - restrictions pertaining to enterprise-specific procedures
- circuit breaker construction principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
  - requirements for the use of manuals, circuit breaker diagrams/plans and drawings
  - types, characteristics and capabilities of HV substation circuit breakers installed
  - use, characteristics and capabilities of specialised tools and equipment
  - identification of components within the circuit breaker and associated control housings
  - identification of energy sources within the circuit breaker and associated control housings
  - identification of insulation paths within the circuit breaker

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  - types and characteristics of operating mechanisms
  - types and characteristics of interrupter chambers
  - safety precautions when constructing circuit breakers - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks and types; selection, maintenance and use of PPE
- synchronous condenser principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to synchronous condensers
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of synchronous condensers installed
  - identification of components within the synchronous condensers and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for synchronous condensers
  - techniques in evaluating serviceability of synchronous condensers operation
  - safety precautions when testing and measuring synchronous condensers - safe working practices and procedures; identification of hazards and assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and protocols; and safe working clearances
  - communicating worksite procedures
- commissioning procedures associated with relevant equipment encompassing:
  - standards, codes, commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures - planning, policy, testing techniques and close-out requirements
- detailed operation of instrument transformers encompassing:
  - voltage and current transformer principles and terminology
  - types and classes of current transformers
  - constructions of current transformers
  - characteristics of current transformers
  - testing of current transformers
  - types and categories of voltage transformers
  - constructions of voltage transformers
  - characteristics of voltage transformers
  - testing of voltage transformers
- detailed operation of metering devices and principles encompassing:
  - common circuit configurations
  - meters and measurement principles
  - instrument transformer application
  - testing of metering systems and devices

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- implications of market operation
- detailed operation of communication devices and principles encompassing:
  - types of communication systems
  - interface to power system equipment
  - hardware configurations
  - testing of communication links
- primary plant testing encompassing:
  - transformers - direct current (d.c.) HV tests, alternating current (a.c.) HV tests, induced HV tests, ratio tests, polarity tests, winding resistance tests, impedance tests, insulation resistance tests, transformer vector group tests, winding temperature indicator tests, alarm tests and neutral ct tests
  - circuit breakers - d.c. HV tests, a.c. HV tests, induced HV tests, function tests, operation timing, minimum voltage operation tests, insulation resistance tests, contact resistance test, auxiliary contact test and alarm tests
  - capacitor banks - d.c. HV tests, a.c. HV tests, induced HV tests, neutral ct tests, balance tests and insulation resistance
- effects of harmonics encompassing:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators motors and quality of supply
- basic design features and characteristics of underground cables, lines, poles/structures and associated equipment and/or components encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - overhead lines characteristics - type of components, characteristics of conductor material, mechanical limitations and physical dimensions of lines, current rating factors (heating, voltage drops and power losses) of conductors, aerial bundled cables (HV and low voltage (LV)) and covered conductors
  - characteristics and constructional features of poles and structures - types of poles and structures, characteristics of poles/structure materials, mechanical limitations of poles/structures, footings and additional support techniques
  - characteristics and constructional features of underground cables - underground cables constructional features, insulation materials and abbreviations, cable dielectrics, electric stress and cable voltage drop
  - calculation of cable voltage drop in relation to length of cable run
  - techniques in reducing electrical stress on cables
  - cable rating factors
  - methods of joining and terminating cables
  - techniques in the installation of cables above and below ground
  - techniques in cable testing and the location of cable faults
  - techniques in cable drawing
- power test equipment testing encompassing:
  - safety precautions specific to the use and connection of power test equipment

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  - meter operational principles, such as:
    - moving coil, moving iron, transducer, digital and analogue
  - types, operation and use of meters - phase sequence meters, phase angle meters, instrument transformers, wattmeters, energy meters, phase system analysers, power oscilloscopes and frequency meters
- principles of transmission, sub-transmission and zone substation primary plant designs encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the substation design management principles
  - requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types of primary plant designs parameters, such as:
    - electrical equipment in accordance with the single line diagram, bay spacing, busbar heights, statutory and maintenance clearances in accordance with AS 2067:2016 Substations and high voltage installations exceeding kV a.c, and organisational requirements, switchyard equipment layout, lightning protection, and control and power cable routes within and outside switchyard.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 to undertake actual design of transmission, sub-transmission and zone substation primary plant
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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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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UETTDRDS54 Design power system transmission and sub-transmission protection and control

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 design of transmission, sub-transmission and zone substation protection and control systems. It includes basic secondary upgrades, supervisory control and data acquisition (SCADA) modifications or new installations on green field sites. The design must conform to safety regulations and environmental standards and incorporate the principles of safe design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS44 Design power system substations modifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 for and coordinate the design of transmission, sub-transmission and zone substation protection and control systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

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		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the design of transmission, sub-transmission and zone substation protection and control systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the design are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and

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		actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of transmission, sub-transmission and zone substation protection and control systems	**3.1**	Final checks of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS54A Design power system transmission and sub-transmission protection and control.

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 UETTDRDS54 Design power system transmission and sub-transmission protection and control

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
- completing two (2) compliant technical designs, including each of the following:
  - protection and control systems implemented to suit statutory and organisational requirements
  - alternating current (a.c.) and direct current (d.c.) circuit diagrams
  - supervisory control and data acquisition (SCADA) hardwired and serially communicated signals
  - metering
  - load control
  - power factor control
  - a.c. and d.c. supplies
  - protection and control panel layouts
  - control cable termination diagrams
- completing designs, including all the following:
  - activities that address the correction of errors in the process
  - application of a design control checklist, which lists all of the required design activities to be carried out in this process
- 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:

- feeder automation system encompassing:
  - function of feeder automation system and the main components

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- operation procedure for a remote field device from a local control station
- functions of 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

- commissioning procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures - planning and policy, testing techniques and close-out requirements
- design principles of substation low voltage (LV) a.c. and d.c. supply systems encompassing:
  - 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
- design principles of substation control systems encompassing:
  - 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
  - control system design specifications, functions and alarms
  - substation control system requirements, such as:
    - circuit breaker control - auto reclose, pole discrepancy, anti-hunting and spring charge timer over run
  - transformer control - parallel operations, cooling control, master/slave operation, tap changer control and alarm systems
  - reactive plant control systems - over voltage/under voltage, under frequency load shed

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and VAR control

- commissioning procedures associated with distribution protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures - planning, policy and testing techniques
  - close-out requirements
- operation and maintenance procedures associated with voltage regulation schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - principles of operation and operating sequences - voltage control, VAR control, live bus/dead bus synchronising checks, tap changer (TC) principles, requirements for parallel operation, settings and grading
  - techniques associated with isolation requirements, enterprise maintenance requirements, setting checks, LV injections and electrical measurements
  - ancillary equipment, such as:
    - transducers, buswire schemes, tap position indicators, local/remote control systems and alarm systems
  - voltage regulation scheme types, including electro mechanical, micro-processor or combinations of both
- types and applications of test equipment encompassing:
  - standards, codes, Commonwealth/State/Territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
  - types and applications of test equipment used on discrete protection scheme
  - techniques in the use of test equipment - electronic test equipment (Doble and Ohmnicrome, gas injection equipment, manufacturer test equipment, multimeters, phase angle meters and meggers)
- electrical equipment associated with distribution field device protection and control schemes encompassing:
  - types and applications of electrical equipment - characteristics and capabilities, such as:
    - schemes, automatic circuit reclosers (ACRs), gas switches, secondary injection tests, primary injection tests, TMR radios, SCADA, remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, DC supplies, AC supplies and alarms
- circuit breaker auxiliary systems encompassing:
  - types and characteristics of high pressure air systems - air storage and air handling processes
  - types and characteristics of DC systems - battery types, charging systems and protection systems

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  - types and characteristics of special ambient gases (SF6) systems - gas conditioning, storage and handling systems
  - types and characteristics of vacuum interrupters
  - types and characteristics of oil filled and oil handling
- detailed operation and setting of 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
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes - 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
  - busbar protection and CB failure protection
  - reclose system - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- detailed operation of 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 SCADA
  - complex protection systems for communications
  - harmonic control
  - point on wave switching
- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence, and the use of oscilloscopes
- detailed operation of protection test equipment encompassing:

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  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference and the use of primary, secondary and gas injection equipment
- detailed operation of control equipment test equipment encompassing:
  - care and safe use
  - operating principles
  - comparing of different control system methods and equipment for the same purpose - circuit breaker, isolators, OLTC, pumps, fans and fire systems
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes encompassing reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of over current protection equipment used on distribution systems
  - operation of ACRs and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) system
- principles of transmission, sub-transmission and zone substation control and protection designs encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the substation design management principles
  - requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types of drawings to be produced - AC and DC circuit diagrams, panel layouts, connection diagrams, label lists and control cable schedules
  - types of control and protection designs parameters - protection and control systems implemented to suit statutory and organisational requirements, AC and DC circuit diagrams correct and documented
  - SCADA hardwired and serially communicated signals, metering, load control, power factor control, AC and DC supplies, protection and control panel layouts, and control cable termination diagrams.

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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 to undertake design of transmission, sub-transmission and zone substation protection and control systems
- 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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UETTDRDS55 Design power system transmission and sub-transmission substation earthing

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 design of transmission and sub-transmission zone substation earthing. It includes earth resistivity tests coordination, design of the earth grid, electrodes, grid connections, equipment connections and remote earthing connections to conduct maximum earth fault currents without exceeding the maximum allowable earth potential rise (EPR). The design includes earthing engineering aspects and must conform to safety regulations and environmental standards and incorporate the principles of safe design. However, it excludes the certification of earthing design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS44 Design power system substations modifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Work safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

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UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Design

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 for and coordinate the design of transmission, sub-transmission and zone substation earthing	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or

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		established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the design of transmission, sub-transmission and zone substation earthing	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to avoid incidence and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the earth grid are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

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		specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of transmission, sub-transmission and zone substation earthing	**3.1**	Final checks of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS55A Design power system transmission and sub-transmission substation earthing.

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Links

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Assessment Requirements for UETTDRDS55 Design power system transmission and sub-transmission substation earthing

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
- completing two (2) compliant technical designs, including each of the following:
  - coordination and analysis of earth resistivity tests
  - design and drafting of earth grid, including electrodes, grid connections, equipment connections and remote earthing connections to conduct maximum earth fault currents without exceeding the maximum allowable earth potential rise (EPR)
  - confirmation of acceptable step and touch potentials, including attenuation or hazard control measures
  - confirmation of control of transfer of EPR
- completing designs, including all the following:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- distribution earthing system encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to the distribution earthing system
  - reason and types of distribution earthing systems
  - terminologies used in the earth systems, including, touch and step potential
  - conditions associated when an active high voltage (HV) conductor fails to earth

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  - selection of earthing electrodes and grids
  - determination of the earthing resistance of copper clad rods using earthing monograms
- principles of transmission, sub-transmission and zone substation earthing designs encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the substation design management principles
  - requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
  - types of activities to be carried out - earth resistivity tests coordination, design of the earth grid and confirmation of control of transfer of EPR
  - types of earthing design parameters - coordination and analysis of earth resistivity tests, design and drafting of earth grid, including electrodes, grid connections, equipment connections and remote earthing connections to conduct maximum earth fault currents without exceeding the maximum allowable EPR, confirmation of acceptable step and touch potentials, including attenuation or hazard control measures, water, telephone service and low voltage (LV) neutral supplies isolation to isolate local EPR.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRDS56 Design power system transmission, sub-transmission & zone substation civil & structural components

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 design of transmission, sub-transmission and zone substation civil and structural components. It includes augmentations of existing substations or new substations on green field sites. The design includes civil and structural engineering aspects and must conform to safety regulations and environmental standards and incorporate the principles of safe design. However, it excludes the certification of civil and structural design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS44 Design power system substations modifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy

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management policies & procedures

Competency Field

Design

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 for and coordinate the design of transmission, sub-transmission and zone substation civil and structural components	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of substations, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or

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		established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the design of transmission, sub-transmission and zone substation civil and structural components	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to avoid incidence and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the design are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to

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		analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of transmission, sub-transmission and zone substation civil and structural components	**3.1**	Final inspections of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS56A Design power system transmission, sub-transmission and zone substation civil and structural components.

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Assessment Requirements for UETTDRDS56 Design power system transmission, sub-transmission & zone substation civil & structural components

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
- completing two (2) compliant technical designs, including each of the following:
  - earthworks
  - foundation design, including relationship to geotechnical analysis
  - footing layout, including assignment of reference levels and benchmark
  - conduits, pits and drainage
  - hydraulics, including fire and safety facilities
  - access roads
  - fences and gates, including implementation of earth potential rise (EPR) control measures
  - transformer fire and sound attenuation measures, bunding and oil containment
  - indoor and outdoor structural steelwork
- completing designs, including all the following:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- principles of transmission, sub-transmission and zone substation civil and structural designs encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply

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authority regulations and/or enterprise requirements applicable to the substation design management principles
- requirements for the use of the substation system construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks
- types of activities to be carried out - earthworks, foundation design, including relationship to geotechnical analysis; footing layout; including assignment of reference levels and benchmark; conduits, pits and drainage; hydraulics; including fire and safety facilities; access roads, fences and gates, including implementation of EPR control measures, transformer fire and sound attenuation measures, bunding and oil containment, indoor and outdoor structural steelwork
- types of civil and structural parameters - access road suitable for low loaders and cranes (width, space turning radius and gradient); outdoor steelwork (stands), including strain/landing tower, surge arrestor, isolator, voltage transformer, current transformer, circuit breaker, fault thrower, lightening masts, cages/screens, sealing ends, cable supports, operating stands and busbar supports
- indoor steelwork, including frequency injection, cable supports, cages/screens and cable ladder supports.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 to undertake design of transmission, sub-transmission and zone substation civil and structural components
- 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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UETTDRDS57 Design power system overhead 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 the technical design of overhead transmission networks to relevant standards, including electrical clearances; electrical and mechanical loadings; earthing; environmental considerations; minor civil aspects; and the handling of waterway, railway and other crossings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements, and incorporates the principles of safe design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy

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management policies & procedures

Competency Field

Design

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 for and coordinate the design of overhead transmission systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of overhead transmission systems, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or

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		established procedures
	1.8	Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the design of overhead transmission systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to avoid incidents and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the design are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

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	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of overhead transmission systems	**3.1**	Final inspections of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS57A Design power system overhead 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 UETTDRDS57 Design power system overhead 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
- completing six (6) compliant technical designs of an overhead transmission system with at least one (1) relating to each of the following project types:
  - multi-tower extensions
  - new installations
  - multi-circuit overhead lines
- completing designs, including all the following:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission structures and hardware encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings

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  - types of structures
  - types and function of associated hardware/equipment and insulators
  - types of conductors
  - location of transmissions structures
  - other equipment used on transmission structures, e.g. aircraft warning devices
  - voltages on transmission structures
- procedures for routine maintenance on transmission structures and hardware encompassing:
  - procedures for gaining access permits
  - reasons for gaining access
  - types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the Transmission Supply Authority (TAS)
  - erecting and removing transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system and construction of a square rigging system
  - procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
  - installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, and procedures for installations of temporary work platforms
  - installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration, and procedures for the installation of dampers onto conductors
  - dead line insulator washing - supply authority regulations and procedures for washing de-energised transmission lines
- procedures for installation and maintenance on transmission lines, structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines and sag/tension requirements
  - construction types and structures used in transmission lines
  - types, sizes and characteristics of transmission conductors - aluminium conductors, steel reinforced and earthing conductors
  - types of electrical connections used to connect transmission conductors - compression termination and bolted termination
  - causes and effects of poor electrical connections
  - types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
  - techniques for stringing, tensioning and terminating transmission conductors
  - techniques for installation of associated hardware used on transmission towers
  - techniques for maintenance of damage transmission conductors - repair and replacement

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- inspection of towers and structures used for transmission lines encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - characteristics of materials used for towers structures within the electrical transmission system - faults that occur that influence the integrity of the structure
  - deterioration prevention techniques - relationship between steel and other materials, inspection procedures for deterioration, deterioration prevention procedures in steel and procedures for the repair of deterioration in steel
- inspection of transmission lines encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - clearances and safety procedures
  - ground line inspection procedures of electrical transmission lines - requirements for inspection of transmission lines and insulators, use of specific equipment and testing devices during testing/inspection, techniques in transmission line inspection and methods of recording data
  - overhead line inspection procedures of electrical transmission lines - methods and requirements for overhead line inspection on electrical structures, clearances for overhead conductors, cables and structures, techniques used to obtain close inspection of transmission lines, use of specific equipment and testing devices during testing/inspection and methods of recording data
- plant, equipment and tools used for high voltage (HV) live line work encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with plant, equipment and tools used for HV live line work
  - safety precautions when working on plant, equipment and tools using hotstick combined - safe working clearances; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks, types; selection, maintenance, storage and uses of personnel protective equipment (PPE); and authorisation to work systems
  - identification of plant, equipment and tools used for HV live line work - types, applications, construction, characteristics, limitations and safe working load
  - serviceability of plant, equipment and tools used for HV live line work - inspection procedures, testing procedures, maintenance procedures and storage procedures
  - relationship of live line work access authority/permit, disabling auto-reclose function and ensuring correct functioning of fault current protective devices prior to live line work
  - live line access authorities, disabling auto-reclose function and ensuring fault current protective devices prior to live line work
  - conductor supports encompassing: methods, types of equipment, construction, characteristics and limitations
  - techniques in selecting appropriate conductor support method in accordance with requirements
  - calculation of loads and wind loading on conductors
  - effects of resultant forces when transferring conductor loads
  - rigging procedures for conductor support equipment

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- HV switching principles encompassing:
  - 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; and the purpose and procedure for operational forms, 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 effectiveness of operational earthing, acceptable industry procedures and PPE
  - 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
- feeder automation system encompassing:
  - 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 encompassing:
  - legislation, standards, codes, legislation, 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

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  - operational forms, access authorities and permits, and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits, hazard/risk assessments, and the 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 and airbreaks; switches and 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
  - 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
- alternating current (a.c.) transmission system components encompassing:
  - support structures and reasons for selection
  - insulators and reasons for selection
  - conductors and reasons for selection
  - vibration management systems and principles
  - line ratings based on voltage, span, tension and temperature
- a.c. transmission line electrical parameters encompassing:
  - typical arrangements
  - parameters of significance
  - calculation of line parameters - calculation of resistive, inductive and capacitive values assuming regular transposition and solid conductors
  - comparison with actual values
  - typical parameter values and ratios for different voltage level lines
- a.c. transmission line models encompassing:
  - types of transmission line models based on line length
  - calculation of voltage drop, line regulation and transmission efficiency
  - load sharing between lines
- basic design features and characteristics of transmission structures and associated equipment and/or components encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing of poles/structures and associated equipment and/or components
  - transmission systems principles - terminologies, primary and secondary, voltage levels

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and types of lines
    - characteristics of structure - types of structure (towers and poles, concrete and steel), characteristics of types of structures, installation methods and maintenance techniques
    - characteristics of associated equipment used on structures - insulators and earthing, including overhead earth and communication lines
- voltage control techniques encompassing:
    - conditions leading to voltage collapse
    - effects on system of HV and 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 changer (OLTC) transformers; and static VAR compensators (SVCs), including saturated reactor compensators; thyristor controlled reactor compensators and combined systems
    - production of harmonics and methods of harmonic control
    - location of voltage control devices within the system
- corona encompassing:
    - factors leading to the generation of corona - voltage levels, conductor spacings, conductor sizes and shaping, and atmospheric conditions
    - consequences of corona
    - corona reduction - conductor selection, conductor bundling, conductor surface treatment and grading rings
    - internal discharge - causes of internal discharge, effects of internal discharge and testing techniques
- effects of harmonics encompassing:
    - characteristics and effects of harmonics on protection device functions/malfunction
    - effects of harmonics on transformers, generators, motors and quality of supply
- HV system load calculation principles encompassing:
    - structure of HV systems
    - ratings of HV system components
    - relationship to HV customers
    - methods of determining load on HV systems
    - records of load on HV systems
    - effect of added load on HV feeders, such as:
        - variation of current, voltage, power, reactive power and power factor
    - load flows in parallel or loop operation
    - enterprise-specific network coordination tools
- EHV system load calculation principles encompassing:
    - structure of EHV transmission systems
    - ratings of EHV system components
    - relationship to EHV customers
    - relationship to generation sources
    - methods of determining load on EHV systems

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- records of load on EHV systems
- effect of added load on EHV transmission systems - variation of current, voltage, power, reactive power and power factor
- load flows in parallel or loop operation
- enterprise-specific network coordination 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 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 to undertake design of overhead transmission systems
- 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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UETTDRDS58 Design underground 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 the technical design of underground transmission networks to relevant standards, including cable sizing and locations, soil resistivity and heat dissipation, backfill and trenching details, minor civil aspects and dynamic and cyclic ratings. It also includes the necessary established procedures to ensure the line design conforms to specific organisational technical standards, operational and system planning requirements and incorporates the principles of safe design.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE104A Solve problems in d.c. circuits

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

UETTDRDS39 Prepare and manage detailed construction plans for electrical power system infrastructure

UETTDRDS45 Organise and implement ESI line and easement surveys

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Work safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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Competency Field

Design

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 for and coordinate the design of underground transmission systems	**1.1** Work health and safety (WHS)/occupational health and safety (OHS)practices/procedures and environmental and sustainable energy procedures, which may influence the design of underground transmission systems, are reviewed and determined
	1.2 Purpose of the design is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the design are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.6 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8 Resources, including personnel, equipment, tools and PPE, required for the job are identified, scheduled and

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		coordinated and confirmed safe and in technical working order
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
2 Carry out and coordinate the design of underground transmission systems	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to avoid incidents and accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	System design decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the design are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements

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	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the design of underground transmission systems	**3.1**	Final inspections of the design are undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the design brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design documents are issued and records are updated 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 UETTDRDS58A Design underground 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 UETTDRDS58 Design underground 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
- completing six (6) compliant technical designs of an underground transmission network with at least one (1) relating to each of the following project types:
  - alteration to existing assets
  - underground supplies between substations including overhead to underground connections
- completing designs, including all the following:
  - activities that address the correction of errors in the process
  - application of a design control checklist which lists all of the required design activities to be carried out in this process
- 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:

- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission structures and hardware encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - types of structures

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  - types and function of associated hardware/equipment and insulators
  - types of conductors
  - location of transmissions structures
  - other equipment used on transmission structures, e.g. aircraft warning devices
  - voltages on transmission structures
- procedures for routine maintenance on transmission structures and hardware encompassing:
  - procedures for gaining access permits
  - reasons for gaining access
  - types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the Transmission Supply Authority (TAS)
  - erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system, and construction of a square rigging system
  - procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
  - installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, and procedures for installations of temporary work platforms
  - installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration and procedures for the installation of dampers onto conductors
  - dead line insulator washing - supply authority regulations and procedures for washing de-energised transmission lines
- procedures for installation and maintenance on transmission lines, structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines and sag/tension requirements
  - construction types and structures used in transmission lines
  - types, sizes and characteristics of transmission conductors - aluminium conductors steel reinforced and earthing conductors
  - types of electrical connections used to connect transmission conductors - compression termination and bolted termination
  - causes and effects of poor electrical connections
  - types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
  - techniques for stringing, tensioning and terminating transmission conductors
  - techniques for installation of associated hardware used on transmission towers
  - techniques for maintenance of damage transmission conductors - repair and replacement
- high voltage (HV) switching principles encompassing:

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- 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; and the purpose and procedure for operational forms, 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 effectiveness of operational earthing, acceptable industry procedures and personal protective equipment (PPE)
- 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

- feeder automation system encompassing:
  - 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
- layout principles for underground mains distribution extension encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to underground mains distribution extension
  - requirements for the use of underground mains construction manuals, system diagrams/plans and drawings and for plans such as work method statements for the control of WHS/OHS risks

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  - methods in determining material, equipment and tool lists - components types and quantity required, spacing of components and equipment, and costings of items and components
  - purchasing and contractual arrangements, including requirements to eliminate WHS/OHS hazards, minimise risks and provide residual WHS/OHS risk information
  - determination of conductor size, type and route length
  - resources needed for the laying of conductors
  - determining the appropriate excavation for the location
  - determining the size and depth of excavation
  - determining the trench and pit layout procedures
  - minimum clearances between conductors
  - estimation of the duration of underground distribution extension project
- effects of harmonics to an extent indicated by the following aspects:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators, motors and quality of supply
- HV system load calculation principles encompassing:
  - structure of HV systems
  - ratings of HV system components
  - relationship to HV customers
  - methods of determining load on HV systems
  - records of load on HV systems
  - effect of added load on HV feeders - variation of current, voltage, power, reactive power and power factor
  - load flows in parallel or loop operation
  - enterprise specific network coordination tools
- EHV system load calculation principles encompassing:
  - structure of EHV transmission systems
  - ratings of EHV system components
  - relationship to EHV customers
  - relationship to generation sources
  - methods of determining load on EHV systems
  - records of load on EHV systems
  - effect of added load on EHV transmission systems - variation of current, voltage, power, reactive power and power factor
  - load flows in parallel or loop operation
  - enterprise-specific network coordination tools.

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 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
- 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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UETTDREL11 Apply sustainable energy and environmental procedures

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 apply sustainable energy and environmental procedures in the electricity supply industry (ESI).

It includes the implementation of environmental procedures to specific projects/sites, the identification of possible environmental risks and impacts, and the undertaking of work in accordance with sustainable energy and energy conservation principles.

It also includes the provision of recycling materials; the recording and reporting of environmental incidents; and the process of reviewing, participating in and contributing to environmental procedures in accordance with the workplace.

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

There are no prerequisite competencies to this unit.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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 implement environmental and sustainable energy procedures	**1.1** Works schedules, construction 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) and workplace procedures for implementing environmental and sustainable energy procedures are obtained and confirmed for the purposes of the work to be performed
	1.4 Environmental and sustainable energy procedures are identified and consulted with relevant personnel for completion within acceptable timeframes 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 work permits are obtained, understood and signed 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
2 Apply environmental and sustainable energy procedures	**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 Power tools/equipment techniques and practices are followed in accordance with environmental and sustainable energy procedures
	2.3 Relevant environmental procedures are applied to specific projects/worksites
	2.4 Principles of sustainable energy and energy conservation are applied to work in accordance with workplace

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		procedures
	2.5	Recycling and/or reuse of materials is applied to work site, as required
	2.6	Unplanned events in the implementation of environmental and sustainable energy practices are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete environmental and sustainable energy procedures	**3.1**	Completed work is checked against work plan, 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 environmental and sustainable energy procedures and workplace procedures
	3.4	Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with environmental and sustainable energy procedures and workplace procedures
	3.5	Relevant work permits are signed off and environmental risks/incidents and potential impacts are reported and recorded 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDREL11A Apply sustainable energy and environmental procedures.

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 UETTDREL11 Apply sustainable energy and environmental procedures

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
- completing environmental management documentation using all of the following:
  - environmental risk assessment
  - legislative requirements
  - sustainable energy principles and practice
- 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:

- environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the control of environment associated with the worksite, including:
  - relevant federal legislation
  - relevant state/territory legislation
  - relevant local government by-laws
  - relevant government or quasi government policies and regulations
  - relevant community planning and development agreements - land care agreements
- employer and employee responsibilities
- methods of obtaining information on environmental issues and updates
- methods of identifying environmental impacts from work-related activities
- meaning of environmental terms, including:
  - identification, assessment and control of risks
  - compliance

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  - best practice
  - sustainable energy
- procedures in implementing management plans to ensure compliance
- methods of obtaining updated environmental information and data sheets on the proper use and handling of equipment and materials
- WHS/OHS legislation, hazardous substances/dangerous goods regulations; and enterprise requirements applicable to environmental care when handling materials, including provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
- types and application of personal protective equipment (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 such equipment, including:
  - vehicle loading crane
  - chainsaw
  - enterprise vehicles
  - explosive power tools
- procedures for handling and control of spillages of herbicides
- methods of disposing and storage of herbicides, pesticides, oils and chemicals
- methods of cleaning mobile plant, equipment and tools
- emergency procedures for spillages of oil to reduce risks to the environment, including:
  - methods of cleaning up excessive spillages
  - methods of protection to surrounding environment
  - procedures for notification of relevant personnel and authorities
  - recording procedures
- recording of data.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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industry for applying sustainable energy and environmental procedures
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UETTDREL12 Operate plant and equipment near live electrical conductors and 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 involves the skills and knowledge required to operate plant and equipment near live electrical conductors and apparatus in the electricity supply industry (ESI).

It includes using relevant plant and equipment, relevant legislation, regulatory requirements for the operation of plant and equipment and conducting operational checks. It also includes, positioning road signs, barriers and/or warning devices and completing log books and job completion documentation.

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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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 operate plant and equipment near energised and exposed electrical conductors/apparatus	**1.1** Works schedules, construction 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) policies and procedures related to requirements and workplace procedures for the operation of plant and equipment near energised and exposed electrical conductors/apparatus are obtained and confirmed for the purposes of the work to be performed and communicated to others
	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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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 the operation of plant and equipment near energised and exposed	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace

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electrical conductors/apparatus		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	Plant and equipment near energised and exposed electrical conductors/apparatus are operated to agreed timeframes, to quality standards with a minimum of waste in accordance with workplace procedures
	2.4	Plant and equipment are safely operated near energised and exposed electrical conductors/apparatus in accordance with job requirements, work permits and workplace procedures
	2.5	Unplanned events in the operation of plant and equipment near energised and exposed electrical conductors/apparatus are responded to in accordance with workplace procedures and approval of authorised personnel
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete the operation of plant and equipment near energised and exposed electrical conductors/apparatus	**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 cleaned 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 and plant and equipment are checked, returned to service/stored appropriately in accordance with workplace procedures
	3.6	Work records, reports and/or documentation 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL12A Operate plant and equipment near live electrical conductors and 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 UETTDREL12 Operate plant and equipment near live electrical conductors and 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
- using at least four (4) of the following support equipment:
  - portable generators
  - chain saws
  - concrete cutters
  - jack hammers
  - welders
  - compressor
  - crimper-cutters
  - pumps
  - post hole diggers
  - drills
  - friction grip winches
  - pullers
  - block and tackle
- using at least one (1) of the following support equipment:
  - elevated work platform (EWP
  - back hoes
  - self-loading vehicle
  - borer
  - bobcat
  - trench excavators
  - heavy vehicles
- 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:

- safety precautions, requirements and responsibilities
- selection and use of appropriate personal protective equipment (PPE)
- chain saw operation, including:
  - parts and function of components and ancillary equipment
  - pre-operational checks
  - starting procedures
  - safe use of chain saw under load
  - safe transporting and storage procedures
- standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with (EWP, including relevant certification and licensing, including:
  - safe working clearances
  - safe operation procedures and the mandatory wearing of harness/attachment requirements
  - safety observers
  - inspection and testing procedures prior to use
  - set-up, operation and shutdown procedures for an EWP
- emergency procedures for an EWP, including:
  - escape procedures for an EWP
  - rescuing procedures
  - mechanical failure procedures
- types of EWP - insulated/uninsulated
- standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with safe use of enterprise vehicles, including relevant certification and licensing such as:
  - motor cars
  - light and heavy commercial trucks
  - heavy truck/trailer combination
  - four-wheel drive vehicles
- compliance with regulations associated with the securing of loads prior for transportation
- standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with portable hydraulic equipment and portable pneumatic equipment, including relevant certification and licensing, including:
  - safe working clearances
  - safe operation procedures
  - safety observers
  - inspection and testing procedures prior to use
  - set-up, operation and shutdown procedures
- permit to work systems and isolation procedures

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- standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- safe use of rigging equipment, tools and associated equipment, including:
  - types, techniques and application
  - site inspection procedures
  - identifying hazards, assessing and controlling risks
  - appropriate sequence of loading and unloading
- determining the mass and dimensions of load
- selection and inspection procedures, including:
  - rigging equipment, materials and tools, such as:
    - natural and synthetic fibre ropes and chains, fittings, winch and capstan
  - ratings of wire ropes and slings
  - removing, repairing and replacing of damaged parts
- techniques for assembling and erecting power winches and capstans
- checking the integrity of support structure, and visual inspection of load connections
- techniques in moving, lifting, shifting, managing and placing loads, including:
  - use of appropriate communication and signalling methods
  - codes of practice/compliance
  - enterprise and Commonwealth/state/territory legislative requirements
  - weather conditions
  - erection of safety nets and lines
  - methods of fixing and anchoring loads
  - load stability.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, facilities, equipment and PPE currently used in industry for operating plant and equipment near live electrical conductors and apparatus
- 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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UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

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 compliance of environmental and incidental response procedures whilst undertaking tasks in the electricity supply industry (ESI) workplace and refers to relevant legislation, codes and practices and established procedures.

The unit refers to compliance with relevant sections of federal and state/territory work health and safety (WHS)/occupational health and safety (OHS) and Environmental Protection Acts. The checking of plant and equipment should be performed through visual and mechanical checks. The plant and equipment used is that typically used in preparing worksites and compliance with environmental policies and procedures.

Relevant regulations and procedures are referred to, but not limited to, the worksite and the use of plant; machinery/equipment; cleaning materials and aids; equipment operation; personal protective equipment (PPE), including safety boots, eye and ear protection, and safety helmets.

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

There are no prerequisite competencies to this unit.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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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 comply with environmental and incident response procedures	**1.1** Work instructions are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule
	1.3 WHS/OHS and environmental policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist with complying with environmental and incident response procedures are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and emergency exits kept clear according to given instructions and established procedures
	1.6 Scope of responsibility under relevant work permits are received and confirmed according to requirements and established procedures with relevant personnel
	1.7 Resources, including environmental compliance and personal protective equipment (PPE), required for the incident are obtained and in working order according to established procedures
	1.8 Relevant responsibilities associated with first aid and other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9 Client issues are referred to appropriate personnel in accordance with industry and community standards
	1.10 Site is reviewed according to given instructions and the work schedule for a quality outcome and to minimise risk and damage to property, commerce and individuals

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		in accordance with established procedures
	1.11	Road signs, barriers and warning devices are positioned in accordance with requirements
2 Carry out compliance with environmental and incident response procedures	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Environmental requirements for the work are mentioned and reviewed and control measures recommended for inclusion in the work process
	2.3	Any environmental incidents and potential problems are referred to appropriate personnel in accordance with established procedures
	2.4	Lifting, climbing, working in confined spaces and/or aloft, and use of power tools, techniques and practices are safely followed in accordance with given instructions and according to requirements to eliminate the prospects of incidents
	2.5	Operational knowledge for compliance with environmental and incident response procedures is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.6	Complying with environmental and incident response procedures is carried out in accordance with given instructions and established procedures
	2.7	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.8	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.9	Problems associated with complying with environmental and incident response procedures are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met

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	2.10	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete the compliance with environmental and incident response procedures	**3.1**	Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures
	3.2	Accidents and incidents are reported to authorised personnel in accordance with established procedures
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Appropriate personnel are notified of work completion according to established procedures
	3.6	Environmental completion records, report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDREL13A Comply with sustainability, environmental and incidental response policies and procedures.

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Links

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Assessment Requirements for UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

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
- completing all of the following:
  - identifying potential environmental hazards
  - applying environmental legislation and codes of practice
  - implementing control measures to eliminate/reduce environmental hazards/incidents
  - applying incident reporting/recording/investigation procedures
  - maintaining a safe and clean workplace environment
  - applying safe manual handling techniques
- 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:

- electrical safe working practices encompassing:
  - risk management and assessment of risk - principle and purpose of risk management, and 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 electrical installations, parts of an electrical system and equipment that operate at LV and ELV, and parts of an electrical system and equipment where high currents are likely
  - risks and control measures associated with high voltage (HV) - parts of an electrical system and equipment that operate at HV, the 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

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  - optical fibre safety - coherent optical sources and joining procedures, and laser safety class 3a devices or their replacement
  - risks and control measures associated with LV - risks associated with modifying electrical installations; fault finding, maintenance and repair; control measures before, during and after working on electrical installations; circuits or equipment; isolation and tagging-off procedures; risks and restrictions in live work and control measures for live work
  - risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials and asbestos, and other fibre reinforced switchboard materials
  - safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device, and checks and storage methods for maintaining the safety of testing devices
- powerline safety practices encompassing:
  - 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 procedures 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, 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; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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
- enterprise-specific policies and procedure instructions encompassing:
  - 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

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  - induction into workplace - location of work area and storage area, timetable, uniform, personal well-being, 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 encompassing:
  - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/ WHS/OHS policies and procedures
  - specific enterprise personal protection equipment (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
- environmental fundamentals encompassing:
  - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the control of environment associated with the worksite - relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations, and relevant community planning and development agreements (including land care agreements)
  - employer and employee responsibilities
  - methods of obtaining information on environmental issues and updates
  - methods of identifying environmental impacts from work-related activities
  - meaning of environmental terms - identification, assessment and control of risks, compliance, best practice and sustainable energy
  - procedures in implementing management plans to ensure compliance
- material handling and the environment encompassing:
  - 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 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

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spillages of oils, herbicides, pesticides and chemicals from equipment, such as vehicle 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

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 compliance with working safely up to the defined safe approach distance (SAD) near energised electrical apparatus, including electrical powerlines, for non-electrical workers.

It includes work functions that may be performed, such as vegetation control, scaffolding, rigging, painting and/or any other activity that requires working safely and complying with requirements and/or established procedures near live electrical apparatus by a non-electrical worker. Also included is the preparation of risk assessment control measures that encompass job safety assessment. It does not include any work that is or may be performed by other competent operatives within the defined safe working zone. The defined safe working zone is that so defined by relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

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

There are no prerequisite competencies to this unit.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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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 safely near live electrical apparatus as non-electrical worker	**1.1** Instructions related to the work to be performed safely near live electrical apparatus as non-electrical worker are received and confirmed
	1.2 Relevant requirements and established procedures to be followed and relevant personnel to be communicated with for the work to be performed are identified
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist in meeting the safety requirements for working near live electrical apparatus as a non-electrical worker are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6 Scope of responsibility and process of relevant work permit(s) issue are identified, received and confirmed according to requirements and established procedures
	1.7 Relevant responsibility associated with first aid, safety observers and/or other related work safety procedures at the worksite are identified in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.8 Processes for identifying and reporting client issues to appropriate personnel are identified in accordance with industry/community standards
	1.9 Site and the work schedule to be prepared are confirmed according to given instructions for a quality outcome and to minimise risk and damage to property, commerce, stock and individuals in accordance and established procedures

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	1.10	Electricity infrastructure assets, related voltages and requirements for working safely near live electrical apparatus as non-electrical worker are identified
	1.11	SAD, including any zones thereof that may apply, as defined in industry guidelines, requirements and/or established procedures for the intended work are confirmed
2 Carry out work safely near live electrical apparatus as non-electrical worker	**2.1**	WHS/OHS principles and practices to reduce the incidents of accidents are identified in accordance with given instructions, requirements and/or established procedures
	2.2	Working safely and complying with all safety requirements for working near live electrical apparatus as a non-electrical worker are followed in accordance with given instructions and established routines/procedures
	2.3	Processes for monitoring and reporting/referring hazards and WHS/OHS risks to immediate authorised personnel for directions according to established procedures are followed
	2.4	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.5	Unexpected events associated with working safely near live electrical apparatus as a non-electrical worker are responded to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
3 Complete work safely near live electrical apparatus as non-electrical worker	**3.1**	Work schedule and anomalies for completion and checking of the work are reported to authorised personnel in accordance with established procedures
	3.2	Processes for reporting to accidents and/or incidents authorised personnel are confirmed in accordance with established procedures
	3.3	Requirements for returning work permits and/or access authorisation permits are confirmed
	3.4	Appropriate personnel are notified of work completion according to established procedures

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3.5 Works completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDREL14A Working safely near live electrical apparatus as a non-electrical worker.

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 UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

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
- completing all of the following:
  - confirming the safe working zone for safe work and access near live electrical apparatus
  - identifying relevant technical standards, acts, regulations and codes/guidelines
  - identifying established (enterprise) procedures
- completing all of the following:
  - confirming the principles of electricity, the three phase power system, electric shock and resuscitation, and power system
  - recognising aerial voltage systems
  - identifying low voltage (LV) aerial circuits
  - identifying high voltage (HV)
- identifying all of the following:
  - procedures in the event of an incident
  - events constituting an incident
  - procedures for responding to incidents
  - hazard and risk assessment procedure
  - conduct worksite hazard assessment
  - confirmation of essential components of hazard assessment checks
  - applying hazard identification in electrical work
  - confirmation of the basic safety principles for work on electrical works
  - hazard identification and risk assessment
  - hazard control
  - risk assessment and management (job safety analysis (JSA)) control
  - the hierarchy of controls, including evaluation, worksite hazard and risk assessment checklist, pre-job hazard assessment check (HAC) items, planned inspection and

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pre-work hazard risk assessment form

- identifying all of the following:
  - use of work permits and/or authorisation permits
  - sustainable energy principles and practices
  - possible effects of weather conditions on working near electrical apparatus as a non-electrical worker
- 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:

- basic electrical principles encompassing:
  - fundamental units - basic measurement of units
  - electrical characteristics of material - characteristics of solid materials; insulators; and terms electrical charge, electrical current and electromagnetic forces
  - nature of electrical current and change - basic rules of electrical current flow
  - sources of electricity - basic fundaments of alternating current (a.c.), direct current (d.c.) and single electromagnetic field source (induction)
  - simple circuits - circuit protection devices used on the network; effects of an open circuit, a closed circuit and a short circuit and earthing – using the ground as a form of conductor to return current back to a source
  - resistance - relationship between voltage and current and resistance (Ohms Law)
  - effects of current - physiological effects and protection for physiological effects; basic principle by which electrical current can result in the production of heat, light and electromagnetic fields and typical effects of current
  - three phase and single-phase power systems - star delta configurations, three phase star connections, relationship between line and phase voltages, three phase 4 wire systems - purpose of the neutral
  - consequences of short circuits - arc flash, electricity supply industry (ESI) protection schemes
  - magnetism - magnetic field patterns, concepts of electromagnetism, effects of electromagnetism and magnetic fields around straight conductors
  - hazards encountered in an ESI environment - touch and step potentials, electric shock, fire, chemicals, falls and safe use of tools and equipment
- transmission, distribution and rail power systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall

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power system - advantages/disadvantages and applications
    - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the HV equipment associated with substations
- fundamentals for working safely near live electrical apparatus for non-electrical worker encompassing:
    - standards, guidelines/codes of practice, Commonwealth/state/territory/local government legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker
    - definitions of terminologies - ‘safe working zone’, ‘risk assessment’, ‘safe approach distances (SAD) zones’, ‘safe working distances’,’ work permits’, access authorisation permits’, ‘technical standards’, ‘isolation procedures’ and 'compliance requirements’
    - WHS/OHS policies and procedures for working safely - duties of a safety observer, permit to work systems and isolation procedures, safe application of different types of tools and equipment and operation of mobile plant and machinery (e.g. elevated work platform (EWP)) near live electrical apparatus
    - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus (including electrical powerlines) for non-electrical worker (work functions that may be performed include vegetation control, scaffolding, rigging, painting and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDREL15 Respond to power systems technical enquiries and requests

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 responding to enquiries of a technical nature using electricity supply industry (ESI) transmission, distribution and rail/tram network requirements, techniques and processes. It includes the relevant application of knowledge of relevant Acts and regulations, codes of practice, guidelines and compliance regimes, and arrangements used to facilitate a response to enquiries or requests. The enquiries may be internal or with customers.

Note: examples include storm codes identification of key equipment, recognition of normal and abnormal industry situations, key processes and systems used in the industry, such as maps and the application of general safety and environmental processes and practices used in the industry.

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

There are no prerequisite competencies to this unit.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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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 respond to technical enquiries and requests	**1.1** Instructions related to responding to enquiries using industry requirements, techniques and processes of a technical nature to be performed are received and confirmed
	1.2 Relevant requirements and established procedures to be followed and relevant personnel (including internal and/or customer) to be communicated with for the work to be performed are identified
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist in meeting the safety requirements for responding to technical enquiries and requests are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear according to established procedures
	1.6 Scope of responsibility and process of relevant work permit(s) issue is identified, received and confirmed according to requirements and established procedures
	1.7 Relevant responsibility associated with first aid, safety observers and/or other related work safety procedures at the worksite are identified in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.8 Processes for identifying and reporting client (including internal and customer) issues to appropriate personnel in accordance with industry/acceptable/community standards are identified
	1.9 Workplace and the work schedule are confirmed according to given instructions for a quality outcome and to minimise risk and damage to property, commerce, stock and individuals in accordance with

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		established procedures
	1.10	Electricity infrastructure assets, related voltages and requirements, where applicable, for working safely near live electrical apparatus as non-electrical worker are identified
	1.11	Safe approach distances, including any zones thereof that may apply as defined in industry guidelines, requirements and/or established procedures for the intended work, are confirmed
2 Carry out responses to technical enquiries and requests	**2.1**	WHS/OHS principles and practices to reduce the incidents of accidents are identified in accordance with given instructions, requirements and/or established procedures
	2.2	Enquiries and/or requests are responded to according to requirements and established procedures, and in a timely manner
	2.3	Working safely and complying with all safety requirements for responding to technical enquiries and requests are followed in accordance with given instructions and established routines/procedures
	2.4	Processes for monitoring and reporting/referring hazards and WHS/OHS risks to the immediate authorised personnel for directions according to established procedures are followed
	2.5	Non-routine events are referred to the immediate authorised personnel for directions according to established procedures
	2.6	Essential knowledge and associated skills are applied in the application of responding to technical enquiries and requests to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.7	Unexpected events associated with enquiries and/or requests of a technical nature are responded to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
3 Complete responses to technical enquiries and	**3.1**	Work schedule and anomalies for completion and checking of the work are reported to authorised

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requests		personnel in accordance with established procedures
	3.2	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures
	3.3	Requirements for returning work permit(s) and/or access authorisation permits, where applicable, are confirmed
	3.4	Appropriate personnel are notified of work completion according to established procedures
	3.5	Works completion records and/or report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDREL15A Respond to power systems technical enquiries and requests.

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 UETTDREL15 Respond to power systems technical enquiries and requests

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
- confirming safe working zone for safe work and access near live electrical and mechanical apparatus
- applying knowledge of relevant acts and regulations, codes of practice, guidelines and compliance regimes, and arrangements used
- identifying established (enterprise) procedures and processes
- confirming the principles of electricity, three phase power system, electric shock and resuscitation, and power system
- recognising aerial voltage systems
- identifying low voltage (LV) networks
- identifying high voltage (HV)networks
- identifying all of the following:
  - procedures in the event of an incident
  - events constituting an incident
  - procedures for responding to incidents
  - hazard and risk assessment general principles and procedures
  - principles for conducting worksite hazard assessment checks, basic safety principles and hazard control measures
- identifying all of the following:
  - purpose and use of work and/or authorisation permits
  - possible effects of weather conditions on working near electrical apparatus as a non-electrical worker
- applying knowledge of critical codes in the industry, e.g. storm code emergencies
- identifying key equipment used in the industry
- recognising normal and abnormal industry situations
- responding to a technical enquiry or request in accordance with established procedures and

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timely manner
- 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:

- engineering applications of material properties encompassing:
  - identification and classification of engineering materials, including material properties
  - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion; and the properties of timbers
- generation power systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail power systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components, typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- fundamentals for working safely near live electrical apparatus encompassing:
  - standards, guidelines/codes of practice, state/territory/local government legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing, applicable to working safely up to the defined safe working zone near energised electrical apparatus (including. electrical powerlines) for non-electrical workers
  - definitions of terminologies - safe working zone risk assessment, safe approach distances zones, safe working distances, work permits, access authorisation permits, technical standards, isolation procedures and compliance requirements
  - WHS/OHS policies and procedures for working safely - emergency response and first aid procedures, such as cardiopulmonary resuscitation (CPR); roles and responsibilities of employers, employees and other parties under WHS/OHS legislation; personal protective equipment (PPE); identifying hazards; assessing and controlling WHS/OHS risks; duties

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of a safety observer; working at heights/confined spaces; permit to work systems and isolation procedures; safe application of different types of tools and equipment
    - operation of mobile plant and machinery, such as an elevated work platform (EWP) near live electrical apparatus
    - electricity supply infrastructure assets and voltages
    - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus (including electrical powerlines) for non-electrical worker (work functions that may be performed include, vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker)
- enterprise-specific policies, procedures and instructions encompassing:
    - responsibilities and duty of care of employer and employee relationship
    - methods of obtaining 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, complaint and issues procedures
    - overview of enterprise professional development - fire-fighting procedures, fatigue management, training and competency development - understanding and promotion
- enterprises-specific WHS/OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to WHS/OHS policies and procedures
    - methods of obtaining 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, and responsibility for 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, 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 encompassing:
    - 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

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diagrams
    - title box - description of parts and version control
- basic network operating principles and parameters encompassing:
    - sources of electricity
    - basic principles of electricity, three phase power system, electric shock and resuscitation, and power system
    - aerial and underground voltage systems
    - LV network systems
    - HV network systems
    - equipment used in a network system
    - multiple earthed neutral (MEN) system
    - hazards and risks in a network system - risk to life, property or commerce, fallen wires/equipment and fires
    - voltage gradients - step potential and touch potential (transferred earth potentials)
- applicable legislation, regulations, standards, industry codes, industry guidelines and policies encompassing:
    - relevant sections of legislation used
    - relevant sections of international or Australian Standards used
    - relevant sections of industry codes used
    - relevant sections of industry guidelines used
    - relevant sections of policies used
    - relevant sections of advisory information used
- incident event procedures
- incidents constituting an event
- incidence response procedures
- general hazard and risk assessment principles and procedures
- principles for conducting worksite hazard assessment checks
- basic safety principles and hazard control measures
- key industry terms and performance indicators and measures used - System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), Momentary Average Interruption Frequency Index (MAIFI), Customer Average Interruption Duration Index (CAIDI), and network owners and operators
- critical industry codes used - storm code emergencies
- key equipment used in the industry - industry-specific equipment, switchgear, transformers, aerial conductors, insulators, poles, mobile plant and mobile equipment
- normal and abnormal industry situations, key processes and systems used in the industry - anomalies report, critical system/network failures/anomalies and key processes and systems used in the industry, e.g. maps, drawings, as well as safety and environment processes and practices; communications systems; fires; automatic switching; emergencies; and security breaches
- techniques and processes for responding to a technical enquiry or request in accordance with established procedures in a timely manner - ethical performance; assessing applications, enquiries or requests; using technology and media, including catalogues to assist

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assessments; client quality service; and reflecting on the completed enquiry or request
- enquiries may be internal or with customers encompassing:
  - customer protocols
  - legal requirements and obligations for property access
- relevant heritage and environmental 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 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
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UETTDREL16 Working safely near live electrical 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 involves the skills and knowledge required to work safely near live electrical apparatus in the electricity supply industry (ESI).

It includes compliance with working safely up to the defined safe approach distance near live electrical apparatus for electrical workers. It also includes complying with work requirements and workplace procedures and preparing risk assessment control measures.

It does not include any work that is or may be performed by other competent operatives within the defined safe working zone. The defined safe working zone is defined by regulatory agencies/bodies, relevant legislation, industry standards, guidelines and codes of practice or other related requirements for safe work and access near live electrical and mechanical apparatus.

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

There are no prerequisite competencies to this unit.

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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 safely near live electrical apparatus	**1.1** Relevant instructions for work to be performed safely near live electrical apparatus as electrical worker are obtained and confirmed
	1.2 Job requirements and workplace procedures are identified and communicated to relevant personnel
	1.3 Work health and safety (WHS)/occupational health and safety (OHS), environmental and workplace procedures are obtained and confirmed for the purposes of the work to be performed
	1.4 Hazards are identified, WHS/OHS risks assessed and control measures identified in accordance with workplace procedures
	1.5 Scope of responsibility and relevant work permits are identified, obtained and confirmed in accordance with job requirements and workplace procedures
	1.6 Client issues are identified and reported to relevant personnel in accordance with workplace procedures
	1.7 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.8 Electricity infrastructure assets, voltages and job requirements for working safely near live electrical apparatus are identified
	1.9 Safe approach distances for work are confirmed as defined by relevant electrical network supply industry standards and workplace procedures
2 Carry out the work safely near live electrical apparatus	**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 Working safely and complying with all safety requirements for working near live electrical apparatus as an electrical worker are followed in accordance with relevant regulations, industry standards, workplace instructions and procedures
	2.3 Unplanned events for working safely near live electrical apparatus are responded to in accordance with

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		workplace procedures and approval of authorised person/s
3 Complete work safely near live electrical apparatus as electrical worker	**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	Relevant work permits are signed off in accordance with workplace procedures
	3.4	Relevant personnel are notified of work completion 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL16A Working safely near live electrical 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 UETTDREL16 Working safely near live electrical 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
- performing all of the following:
  - confirming safe working zone for safe work and access near live electrical apparatus
  - identifying relevant technical standards – acts, regulations and codes/guidelines
  - identifying established (enterprise) procedures
- performing all of the following:
  - confirming principles of electricity, three phase power system, electric shock and resuscitation, and power systems
  - recognising of aerial voltage systems
  - identifying of low voltage (LV) aerial circuits
  - identifying high voltage (HV)
- demonstrating all of the following:
  - procedures in the event of an incident
  - events constituting an incident
  - procedures for responding to incidents
  - hazard and risk assessment procedure
  - conduct worksite hazard assessment
  - confirmation of essential components of hazard assessment checks
  - applying hazard identification in electrical work
  - confirmation of the basic safety principles for work on electrical works
  - hazard identification and risk assessment
  - hazard control
  - risk assessment and management control
  - the hierarchy of controls, including evaluation, worksite hazard and risk assessment checklist, pre-job hazard assessment check (HAC) items, planned inspection and

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pre-work hazard risk assessment form

- applying all of the following:
  - use of work permits and/or authorisation permits
  - sustainable energy principles and practices
  - possible effects of weather conditions on working near electrical apparatus as an electrical worker
- 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:

- electrical safety and principles, including:
  - hazards encountered in an electrical environment and safety procedures for dealing with them - types of hazards (electrical shock, fire from an electrical source, chemical hazards and fall hazards.), factors indicating general unsafe work practices and conditions, and safety practices in the use of common tools and plant
  - rescue techniques and first aid treatment of an electric shock victim - methods to rescue an electrical shock victim in contact with live equipment or conductors; accepted first aid treatment for burns, bleeding and shock; and procedures for conducting expired air resuscitation (EAR) and cardiopulmonary resuscitation (CPR)
  - procedures for dealing with fires and hazardous chemicals associated with electrical equipment - selection and use of different types of equipment used to fight fires associated with electrical equipment, procedures for dealing with a fire associated with electrical equipment, and procedures for dealing with polychlorinated biphenyls (PCB)s
  - basic circuit components and state the function of each - sources of electrical supply, control switches, types and functions of resistive consuming devices, and basic circuit components symbols used in electrical diagrams
  - connection of basic electrical circuits and measurement of circuit parameters - connection of components that make up a single-source single-load circuit, relationship between voltage and current in such circuits, and consequences of a short-circuit and an open-circuit
  - determining voltage, current and resistance - calculation methods and measurement methods
  - cable and conductor terminations to Australian/New Zealand Standards - types of terminations, cable conductor preparation, prepare conductor for termination and termination method (conductor terminations include soldered and pressure types)
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; and how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type

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transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- fundamentals for working safely near live electrical apparatus, including:
  - standards, guidelines/codes of practice, state/territory/local government legislation, supply authority regulations and-or enterprise requirements, including relevant certification and licensing applicable to working safely up to the defined safe working zone near energised electrical apparatus (including electrical powerlines) for non-electrical worker
  - definitions of terminologies - ‘safe working zone’ ‘risk assessment’, ‘safe approach distances zones’, ‘safe working distances’.’ work permits’, access authorisation permits’, ‘technical standards’ ‘isolation procedures’ and compliance requirements’
  - WHS/OHS policies and procedures for working safely - emergency response and first aid procedures, such as CPR; roles and responsibilities of employers, employees and other parties under WHS/OHS legislation; personal protective equipment (PPE); identifying hazards; assessing and controlling WHS/OHS risks; first aid procedures; duties of a safety observer; working at heights/confined spaces; permit to work systems and isolation procedures; and safe application of different types of tools and equipment
  - operation of mobile plant and machinery, such as elevated work platforms (EWP) near live electrical apparatus
  - electricity supply infrastructure assets and voltages
  - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus (including electrical powerlines) for non-electrical worker - work functions that may be performed, including vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, facilities, equipment and PPE currently used in industry for working safely near live electrical apparatus
- 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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UETTDREL17 Operate asset inspection machinery and equipment near live electrical 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 involves the skills and knowledge required to operate asset inspection machinery and equipment near live electrical apparatus in the electricity supply industry (ESI).

It includes inspecting and maintaining machinery and equipment, identifying hazards, assessing risks and implementing risk control measures. It also includes complying with relevant regulatory agencies/bodies, legislation, industry guidelines, codes of practice for safe use of machinery and equipment operating near live electrical and mechanical apparatus.

This unit would be applied by asset inspectors engaged in regular and methodical inspection and treatment of poles and inspection of electrical apparatus in the transmission and distribution industry sector.

The application of the skills and knowledge described in this unit may require a license to operate specific pieces of equipment such as elevated work platforms.

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

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

Competency Field

Entry Level 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 operate machinery and equipment near live electrical apparatus	**1.1** Relevant work instructions are received and confirmed
	1.2 Job requirements are discussed with relevant personnel and performed in accordance with workplace procedures
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) and environmental workplace procedures are received and confirmed
	1.4 Work is prioritised and sequenced following consultation with relevant personnel for completion within acceptable timeframes 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 work permits are obtained, as required, to access and perform work in accordance with job requirements and/or workplace procedures
	1.7 Resources including machinery, equipment and personal protective equipment (PPE) required for the job are obtained and confirmed in working order in accordance with workplace procedures
	1.8 Relevant person responsible for first aid and related work safety procedures at the worksite is confirmed in accordance with workplace procedures to ensure safety measures are followed in the instance of an incident
	1.9 Liaison and communication issues with appropriate personnel, authorities, clients and land owners are

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		resolved to carry out work, where necessary
	1.10	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.12	Traffic management is checked as implemented in accordance with workplace procedures
	1.13	Pre-operational checks are undertaken to confirm safe and correct operation of machinery and equipment for safe use near live electrical apparatus in accordance with job requirements and workplace procedures
2 Carry out the operation of machinery and equipment near live electrical apparatus	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents in accordance with workplace procedures
	2.2	Appropriate machinery and equipment are selected to perform job requirements
	2.3	Machinery and equipment, techniques and practices are followed in accordance with manufacturer instructions and job requirements
	2.4	Machinery and equipment are used near live electrical apparatus in agreed timeframes, to quality standards and with minimum waste
	2.5	Hazard warnings and safety signs are recognised and hazards and identified WHS/OHS risks are reported to immediate appropriate personnel for directions in accordance with workplace procedures
	2.6	Machinery and equipment are safely operated near live electrical apparatus in accordance with work schedule, job requirements, given instructions and workplace procedures
	2.7	Unplanned events are referred to relevant authorised personnel for directions in accordance with workplace procedures
	2.8	Problems associated with the operation of machinery and equipment near live electrical apparatus are attended

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		to using acquired known solutions and skills related to routine procedures to ensure work instructions and workplace procedures are met
	2.9	Known solutions to a variety of problems are applied using acquired knowledge and associated skills
	2.10	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the operation of machinery and equipment near live electrical apparatus	**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 cleaned and confirmed safe in accordance with workplace procedures
	3.4	Machinery, equipment, tools and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant person/s is notified of work completion in accordance with workplace procedures
	3.6	Post-operational checks, minor maintenance and/or relevant documentation of machinery and equipment are conducted in accordance with requirements
	3.7	Relevant work permits are signed off in accordance with workplace procedures
	3.8	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

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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 UETTDREL17A Operate asset inspection machinery and equipment near live electrical 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 UETTDREL17 Operate asset inspection machinery and equipment near live electrical 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
- confirming operational knowledge associated with the operation of control machinery and equipment near live electrical apparatus in all of the following:
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe approach distance so defined by relevant authorities
  - use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures
  - system control – information required and functions
  - vicinity permit – information required and functions
  - confirm environmental principals and procedures
- confirming safe practices associated with the operation of control machinery and equipment near live electrical apparatus in all of the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - events constituting an incident
  - procedures in the event of an incident
  - methods of identifying hazards
  - risk assessment procedures
  - selection of the best position for monitoring and controlling work
  - constant analysis
  - decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and on-going weather conditions

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- confirming the safe operation of machinery and equipment in varying conditions and weather near live electrical apparatus and undertaking pre- and post-operational checks and inspections in at least four (4) of the following:
  - chain saws
  - brush cutters
  - power pruners
  - powered drills
  - *augers
  - air compressors
  - generators
  - jack hammers
  - demolition saws
  - measuring devices
  - extendable mounted cameras
  - (* must do)
- 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:

- assets inspection safety requirements, including:
  - the legal requirements covering WHS/OHS in the workplace
  - requirements for personal safety in the workplace
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with safe use of enterprise vehicles
  - working safely with electrical tools and equipment near electrical apparatus
  - identification of hazards and risks associated with working on or near live electrical apparatus
  - use and application of personal protective equipment (PPE)
  - safe work practices and procedures
- asset inspection machinery and equipment, including:
  - reading and following information on standard operating procedures (SOPs)
  - following verbal instructions
  - selecting machinery and equipment appropriate to the task
  - identifying machinery and equipment defects
  - maintaining machinery and equipment using appropriate techniques
  - safe use of enterprise vehicles
  - operation of machinery and equipment - pre-operational checks, safe use of machinery and equipment, safe transporting and storage procedures according to manufacturer requirements/standard operating procedures

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- adjustments/alignments to a range of machinery and equipment
- common faults and/or defects found in a range of machinery and equipment
- procedures for marking unsafe or faulty machinery and equipment for repair
- procedures for the safe use of hand and power tools
- routine maintenance requirements of a range of machinery, equipment and hand and power tools
- storage location and procedures for a range of machinery and equipment
- hazards/control measures associated with the use of a range machinery 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 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, 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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UETTDREL18 Inspect and treat poles and inspect electrical 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 involves the skills and knowledge required to inspect and treat poles and inspect electrical apparatus in the electricity supply industry (ESI).

It includes testing or examining at eye level to below ground and visually checking above ground of cross-arms, conductors, hardware and equipment attached with the use of the un-aided eye, binoculars and electronic vision equipment to determine the integrity of the poles, structures and hardware attached to them. It also includes completing inspection reports and updating of records to workplace requirements.

This unit would be applied by asset inspectors engaged in regular and methodical inspection and treatment poles and inspection of electrical apparatus in the transmission and distribution industry sector.

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 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

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

Competency Field

Entry Level 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 inspect and treat poles and inspect electrical apparatus	**1.1** Relevant work instructions are received and confirmed
	1.2 Job requirements are discussed with relevant personnel and performed in accordance with workplace procedures
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) and environmental workplace procedures are received and confirmed
	1.4 Work is prioritised and sequenced following consultation with relevant personnel for completion within acceptable timeframes 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 work permits are obtained, as required, to access and perform work in accordance with job requirements and/or workplace procedures
	1.7 Resources, including equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order in accordance with workplace procedures
	1.8 Relevant person responsible for first aid and/or related work safety procedures at the worksite are confirmed in accordance with workplace procedures to ensure safety measures are followed in the instance of an incident
	1.9 Liaison and communication issues with appropriate personnel, authorities, clients and land owners are resolved to perform work, as required

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	1.10	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.12	Traffic management is checked as implemented in accordance with workplace procedures
2 Conduct inspection and treatment of poles and inspect electrical apparatus	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents in accordance with workplace procedures
	2.2	Tools and equipment are selected appropriate to the task in accordance with job requirements and used to produce desired outcomes
	2.3	Requirements for lifting, climbing, working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Poles and electrical apparatus are inspected and safe treatment of poles and structures are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.5	Hazard warnings and safety signs are recognised, hazards identified and WHS/OHS risks reported to immediate appropriate personnel for directions in accordance with workplace procedures
	2.6	Visual inspection of poles, overhead structures, conductors, cables and electrical apparatus used on poles/structures is performed in accordance with work schedule and workplace procedures
	2.7	Poles/structures are tested or examined from approximately eye level to below ground in accordance with workplace procedures
	2.8	Visual checks are performed to identify fungal activity, dry rot, termite and borer infestation in accordance with workplace procedures, as required
	2.9	Treatment of poles/structures is performed in

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		accordance with work schedule, job requirements and workplace procedures
	2.10	Defective or suspect poles are identified in accordance with workplace procedures
	2.11	Unplanned events are referred to relevant authorised person/s for directions in accordance with workplace procedures
	2.12	Known solutions to a variety of problems are applied using acquired knowledge and associated skills
	2.13	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the inspection and treatment of poles and inspect electrical apparatus	**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 cleaned and confirmed safe in accordance with workplace procedures
	3.4	Tools and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Unsafe or faulty tools are identified and marked for repair in accordance with workplace procedures before, during and after use
	3.6	Relevant work permits are signed off and poles and structures are returned to service in accordance with workplace procedures
	3.7	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.

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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 UETTDREL18A Inspect and treat poles and inspect electrical 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 UETTDREL18 Inspect and treat poles and inspect electrical 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
- inspecting and testing at least four (4) of the following:
  - wood
  - steel
  - concrete
  - composite
  - reinforced poles
- conducting all the following:
  - drill test
  - non-intrusive test
- undertaking all the following activities:
  - chemical treatment
  - reinforcement (remove)
  - fit a sleeve to stays/guys
- inspecting all the following:
  - poles and structures
  - overhead conductors/cables
  - underground/overhead transition points
  - electrical equipment
  - hardware
  - earthing systems
- completing inspection reports and updating records for all of the following:
  - poles and structures
  - overhead conductors/cables

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  - underground/overhead transition points
  - electrical equipment
  - hardware
  - earthing systems
- using at least two (2) of the following:
  - un-aided eye
  - binoculars
  - electronic data capture using infra-red and/or digital video camera and/or computer
  - sonic tester
  - drill
- 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:

- poles and of electrical apparatus inspection safety requirements, including:
  - working safely with machinery and equipment near live electrical apparatus
  - working safely on or around electrical equipment through the application of risk management principles and control measures
  - selecting and using appropriate personal protective equipment (PPE)
  - implementing emergency procedures for the rescue of an electric shock victim
  - providing emergency first aid for an electric shock victim
  - safe handling and use of chemical treatments
  - visual checking and treatment of poles and structures
  - inspecting of overhead structures and electrical apparatus used on poles and/or structures
  - documenting inspection findings in accordance with enterprise requirements
- inspection of poles and electrical apparatus/equipment, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - characteristics of wood used for structures within the electrical distribution system - relationship between timber and water, faults that occur that influence the integrity of the structure, effects and types of fungal activity, effects of termite and borer activity, and effects of rot
  - deterioration prevention techniques - relationship between steel, concrete and wood; inspection procedures for deterioration; deterioration prevention procedures in steel, concrete and wood; and procedures for the repair of deterioration in steel, concrete and wood
  - ground line inspection procedures of electrical distribution structures - requirements for pole inspection on electrical distribution structures, use of specific equipment and testing devices during testing/inspection, and methods of recording data
  - overhead line inspection procedures of electrical distribution structures - methods and requirements for overhead inspection on electrical distribution structures, including

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cables, conductors and apparatus; clearances for overhead conductors; cables and structures; use of specific equipment and testing devices during testing/inspection; and methods of recording data.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDREL19 Identify and interpret characteristics of electrical apparatus associated with power industry assets

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 identification and interpretation of electrical apparatus associated with asset inspection, including interpreting the operational characteristics of the electrical apparatus, pole top structures, attachments and the relationship of the various equipment, including the association the equipment has in the correct functioning of the distribution and/or transmission system

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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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 identify and interpret characteristics of electrical apparatus associated with power industry assets	**1.1** Instructions for identifying the electrical apparatus undergoing asset inspection are communicated and confirmed to ensure clear understanding
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the visual checking and treatment of poles and structures, and the inspection of overhead structures and electrical apparatus used on the poles are obtained and confirmed
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored according to established procedures
	1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures
	1.7 Schedule for identifying poles and structures, and the inspection of overhead structures and electrical apparatus, including practices for working safely, are confirmed in accordance with instructions and requirements
	1.8 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.9 Relevant person responsible for first aid and/or related work safety procedures at the worksite are confirmed in

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		accordance with established procedures to ensure safety measures are followed in the instance of an incident
	1.10	Liaison and communication issues with appropriate personnel, authorities, clients and land owners are resolved to carry out work where necessary
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary
	1.13	Traffic management plan is identified and road signs, barriers and warning devices positioned in accordance with requirements, where necessary
2 Identify and interpret characteristics of electrical apparatus associated with power industry assets	**2.1**	WHS/OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures
	2.2	Tools and equipment are selected appropriate to the task requirements and are used to produce desired outcomes
	2.3	Schedule for identifying poles and structures, and the inspection of overhead structures and electrical apparatus used on the poles are followed to ensure work is completed in an agreed time, to a quality standard and with a minimum of waste using appropriate technology
	2.4	Essential knowledge and associated skills are applied for the safe identification of electrical apparatus to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Hazard warnings and safety signs are recognised, hazards identified and WHS/OHS risks reported to immediate appropriate personnel for directions according to established procedures
	2.6	Operational characteristics of the electrical apparatus and associated equipment are understood with respect to the primary purpose of the apparatus and associated equipment within the supply system

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	2.7	Visual checks of the electrical apparatus and associated equipment are performed to identify defective or suspect condition
	2.8	Unplanned events during the identification of electrical apparatus and associated equipment are responded to within the scope of established procedures
	2.9	Known solutions to a variety of problems are applied using acquired knowledge and associated skills
	2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the identification and interpretation characteristics of electrical apparatus associated with power industry assets	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage according to established procedures
	3.5	Unsafe or faulty tools are identified and marked for repair in accordance with established procedures before, during and after use
	3.6	Relevant work permits are signed off and poles and structures are returned to service in accordance with requirements
	3.7	Work completion records, reports and/or documentation and information are finalised and processed and appropriate personnel 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL19A Identify and interpret characteristics of electrical apparatus associated with power industry assets.

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 UETTDREL19 Identify and interpret characteristics of electrical apparatus associated with power industry assets

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
- confirming operational knowledge associated with the characteristics of electrical apparatus in eight (8) of the following:
  - single wire earth return (SWER)
  - high voltage (HV) overhead conductors and cables
  - low voltage (LV) overhead conductors and cables
  - underground cables (as attached to the poles)
  - overhead transition points and termination hardware
  - vibration mitigation hardware
  - insulators, cross-arms, cross-arm mountings and brackets
  - switches, HV fuses and fuse carriers, surge diverters and auto-reclose devices
  - pole mounted transformers and substations
  - possum guards and earth guards
  - angle of the pole
  - height of conductors
  - public lights, bolts and associated pole fixings
- confirming knowledge associated with the characteristics of at least four (4) of the following:
  - wood pole
  - steel pole
  - concrete pole
  - composite pole
  - reinforced poles
- 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:

- electrical apparatus safety requirements encompassing:
  - working safely with machinery and equipment near live electrical apparatus
  - selecting and using appropriate personal protective equipment (PPE)
  - implementing emergency procedures for the rescue of an electric shock victim
  - providing emergency first aid for an electric shock victim
- inspection of electrical apparatus encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - visual checking of poles and structures
  - identification of electrical apparatus associated with power industry assets within the electrical distribution system - SWER, HV overhead conductors and cables, LV overhead conductors and cables, underground cables (as attached to the poles), overhead transition points and termination hardware, vibration mitigation hardware, insulators, cross-arms, cross-arm mountings and brackets, switches, HV fuses and fuse carriers, surge diverters, auto-reclose devices, pole mounted transformers and substations, possum guards, earth guards, angle of the pole, height of conductors, public lights, bolts and associated pole fixings
  - operational knowledge of the purpose of electrical apparatus associated with power industry assets within the electrical distribution system - SWER, HV overhead conductors and cables, LV overhead conductors and cables, underground cables (as attached to the poles), overhead transition points and termination hardware, vibration mitigation hardware, insulators, cross-arms, cross-arm mountings and brackets, switches, HV fuses and fuse carriers, surge diverters, auto-reclose devices, pole mounted transformers and substations, possum guards, earth guards, angle of the pole, height of conductors, public lights, bolts and associated pole fixings
  - interpretation of the operational characteristics and purpose of electrical apparatus associated with power industry assets
  - documenting inspection findings in accordance with enterprise 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 conditions involving realistic and authentic activities that replicate operational 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 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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UETTDREL20 Undertake minor vegetation control and routine minor maintenance of poles and electrical 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 undertaking minor vegetation control and routine minor maintenance of poles and electrical apparatus.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. It also includes compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe use of equipment near live electrical and mechanical apparatus

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

UETTDREL17 Operate asset inspection machinery and equipment near live electrical apparatus

Competency Field

Entry Level 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 undertake minor vegetation control and routine minor maintenance poles and electrical apparatus	**1.1** Work instructions are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the conduct of minor vegetation control and routine minor maintenance of poles and electrical apparatus are obtained and confirmed
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored according to established procedures
	1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8 Relevant person responsible for first aid and/or related work safety procedures at the worksite are confirmed in accordance with established procedures to ensure safety

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		measures are followed in the instance of an incident
	1.9	Liaison and communication issues with appropriate personnel, clients and land owners are resolved to carry out work, where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary
	1.12	Traffic management plan is identified and road signs, barriers and warning devices are positioned in accordance with requirements, where necessary
2 Conduct minor vegetation control and routine minor maintenance on poles and electrical apparatus	**2.1**	WHS/OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures
	2.2	Tools and equipment are selected appropriate to task requirements and are used to produce desired outcomes
	2.3	Lifting and use of tools and equipment, techniques and practices are safely followed in accordance with established procedures and confirmed to eliminate the prospects of incidents
	2.4	Essential knowledge and associated skills are applied for the safe use of selected tools and equipment for undertaking minor vegetation control, and the routine minor maintenance on poles and electrical apparatus to ensure completion in an agreed timeframe, to quality standards with a minimum of waste according to requirements
	2.5	Hazard warnings and safety signs are recognised, hazards identified and WHS/OHS risks reported to immediate appropriate personnel for directions according to established procedures
	2.6	Minor vegetation control is carried out in accordance with the work schedule to requirements and established procedures in a range of geographical conditions

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	2.7	Routine minor maintenance on poles and electrical apparatus is carried out in accordance with work schedule to requirements and established procedures in a range of geographical conditions
	2.8	Unplanned events during the minor vegetation control and routine minor maintenance on poles and electrical apparatus are undertaken within the scope of established procedures
	2.9	Known solutions to a variety of problems are applied using acquired knowledge and associated skills
	2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the minor vegetation control and routine minor maintenance on poles and electrical apparatus	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools and equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage according to established procedures
	3.5	Unsafe or faulty tools and equipment are identified and marked for repair in accordance with established procedures before, during and after use
	3.6	Relevant work permits are signed off and poles and structures returned to service in accordance with requirements, where required
	3.7	Works completion records, reports and/or documentation and information are finalised and processed and appropriate personnel notified 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDREL20A Undertake minor vegetation control and routine minor maintenance of poles and electrical 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 UETTDREL20 Undertake minor vegetation control and routine minor maintenance of poles and electrical 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
- confirming operational knowledge associated with the use of tools and equipment near live electrical apparatus in all of the following:
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV)
  - voltage aerial circuits
  - safe approach distances (SAD) so defined by relevant authorities
  - use of regulations, codes, guidelines and established enterprise procedures
  - vicinity permit – information required and function
  - environmental principals and procedures
- confirming safe practices associated with the use of hand tools and the operation of vegetation control machinery and equipment near live electrical apparatus in all of the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - release and rescue
  - events constituting an incident
  - procedures in the event of/responding to incidents
  - methods of identifying hazards
  - risk assessment procedures
  - constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and ongoing weather conditions
- safely using in varying geographical conditions at least two (2) of the following:

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  - chainsaws
  - brush cutters
  - power pruners
  - air compressors
  - generators
  - demolition saws
- safely using in varying conditions and weather all of the following:
  - powered drills
  - augers
  - jack hammers
  - selection of hand tools
- confirming pre- and post-operational checks, inspections and minor maintenance of tools and equipment on at least six (6) of the following:
  - chainsaws
  - brush cutters
  - power pruners
  - powered drills
  - augers
  - air compressors
  - generators
  - jack hammers
  - demolition saws
  - measuring devices
  - extendable mounted cameras
- 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:

- poles and electrical apparatus maintenance safety requirements encompassing:
  - WHS/OHS principles
  - requirements for personal safety in the workplace and the selection of personal protective equipment (PPE)
  - selecting and safety operating tools and equipment used in the conduct of minor vegetation control and routine minor maintenance on poles and electrical apparatus
  - selecting and using appropriate PPE
  - emergency first aid for an electric shock victim
  - implementing emergency procedures for the rescue of an electric shock victim
  - providing emergency first aid for an electric shock victim

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  - selecting and using Personal Protecting Equipment (PPE)
  - safe use of tools and equipment
  - working safely on and around electrical equipment through the application of risk management principles and control measures
- maintenance of poles and electrical apparatus encompassing:
  - sustainability principles
  - standards, codes, legislation, supply authority regulations and enterprise policies and procedures
  - tools and equipment used
  - maintenance and storage of tools and equipment
  - undertaking pre-operational checks of tools and equipment
  - minor vegetation control
  - undertaking minor vegetation control near live electrical apparatus
  - undertaking routine maintenance of poles and electrical apparatus
  - liaising and communicating with appropriate personnel, authorities, clients and land owners
  - completing of records, reports and 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 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, 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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UETTDREL21 Operate specialised data information equipment near live electrical 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 the operation of specialised data information equipment near live electrical apparatus.

Also included is the preparation of risk assessment control measures that encompass job safety assessment.

It also includes compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe use of equipment near live electrical apparatus.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

Competency Field

Entry Level Cross Discipline

Unit Sector

Not applicable.

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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 operate specialised data information equipment near live electrical apparatus	**1.1** Work instructions are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the operation of specialised data information equipment near live electrical apparatus that are used on the poles are obtained and confirmed
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified; WHS/OHS risks assessed and control measures prioritised, implemented and monitored according to established procedures
	1.6 Relevant work permits are obtained, where necessary, to access and perform work according to requirements and/or established procedures
	1.7 Resources, including specialised data information equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8 Relevant person responsible for first aid and/or related work safety procedures at the worksite are confirmed in accordance with established procedures to ensure safety measures are followed in the instance of an incident
	1.9 Liaison and communication issues with appropriate personnel, clients and land owners are resolved to carry

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		out work, where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work are fully briefed and respective responsibilities confirmed in accordance with established procedures, where necessary
	1.12	Traffic management plan is identified and road signs, barriers and warning devices are positioned in accordance with requirements, where necessary
	1.13	Pre-operational checks are undertaken to confirm safe and correct operation of specialised data information equipment for safe use near live electrical apparatus according to requirements and established procedures
2 Operate specialised data information equipment near live electrical apparatus	**2.1**	WHS/OHS and sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and established procedures
	2.2	Specialised data information equipment is selected appropriate to the task requirements and used to produce desired outcome
	2.3	Lifting and use of tools and equipment, techniques and practices are safely followed in accordance with established procedures and confirmed to eliminate the prospects of incidents
	2.4	Specialised data information equipment, techniques and practices are safely followed in accordance with given instructions and requirements and confirmed to eliminate the prospects of incidents, taking into account prevailing site conditions
	2.5	Hazard warnings and safety signs are recognised, hazards identified and WHS/OHS risks reported to immediate appropriate personnel for directions according to established procedures
	2.6	Specialised data information equipment is safely operated near live electrical apparatus in accordance with the work schedule, requirements, instructions and established procedures

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	2.7	Non-routine events are referred to immediate appropriate personnel for directions according to established procedures
	2.8	Problems associated with the operation of specialised data information equipment near live electrical apparatus is attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
	2.9	Unplanned events during the operation of specialised data information equipment near live electrical apparatus are responded to within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the operation of the specialised data information equipment near live electrical apparatus	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Specialised data information equipment is cleaned, checked and returned to storage in accordance with established procedures
	3.5	Post-operational checks, minor maintenance and/or relevant documentation of specialised data information equipment is conducted according to requirements
	3.6	Relevant work permits are signed off and poles and structures returned to service in accordance with requirements, where required
	3.7	Work completion records, reports and/or documentation and information are finalised and processed and appropriate personnel notified in accordance with

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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 UETTDREL21A Operate specialised data information equipment near live electrical 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 UETTDREL21 Operate specialised data information equipment near live electrical 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
- confirming operational knowledge associated with the operation of specialised data information equipment near live electrical apparatus in all of the following:
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe approach distance (SAD) so defined by relevant authorities
  - use of technical standards, acts, regulations, codes, guidelines and established/enterprise/asset owner's procedures
  - vicinity permit – information required and function
- confirming safe practices associated with the operation specialised data information equipment near live electrical apparatus in all the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - events constituting an incident
  - procedures in the event of/responding to incidents
  - methods of identifying hazards
  - risk assessment procedures
  - constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and ongoing weather conditions
- confirming the safe deployment in varying conditions, and undertaking pre- and post-operational checks, inspections and minor maintenance of specialised data information equipment in at least three (3) of the following:
  - infra-red and/or digital video camera
  - wireless camera

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  - telescopic stick
  - stills digital cameras
  - single lens reflex (SLR) cameras
  - computers/personal digital assistant (PDA)
  - sonic testing devices
  - pneumatic height telescopic cameras
  - laser distance measuring equipment
- 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:

- specialised data information equipment safety requirements encompassing:
  - WHS/OHS principles
  - legal requirements covering WHS/OHS in the workplace
  - requirements for personal safety in the workplace
  - working safely on and around electrical equipment through the application of risk management principles and control measures
  - identification of hazards and risks associated with working on/near live electrical apparatus
  - recognising hazards and WHS/OHS risks
  - implementing emergency procedures for the rescue of an electric shock victim
  - providing emergency first aid for an electric shock victim
  - selecting and using personal protective equipment (PPE)
- specialised data information equipment encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise policies and procedures
  - reading and following information on standard operating procedures
  - following verbal instructions
  - identifying specialised data information equipment defects
  - maintaining specialised data information equipment using appropriate techniques
  - safe use of enterprise vehicles
  - operation of specialised data information equipment - pre-operational checks, safe use of specialised data information equipment, safe transporting and storage procedures according to manufacturer/standard operating procedures (SOPs)
  - completing of records, reports and documentation
  - adjustments/alignments to a range of specialised data information equipment
  - routine maintenance requirements of a range of specialised data information equipment
  - safe use of specialised data information equipment

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- maintenance and storage of specialised data information 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 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, 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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UETTDRIS32 Solve electrical problems in remote community network 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 involves the skills and knowledge required to solve electrical problems in remote community network apparatus in the electricity supply industry (ESI).

It includes solving predictable electrical problems on network apparatus in a remote community. It also includes working safely, applying diagnoses and problem-solving procedures; and using voltage, current and resistance measuring devices to provide solutions derived from measurements and calculations to predictable circuit problems

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

UEENEEE103A Solve problems in ELV single path circuits

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

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 solve electrical problems on remote community network apparatus	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for a given work area are obtained and confirmed
	1.2 Hazards are identified, WHS/OHS risks assessed and control measures identified in accordance with workplace procedures
	1.3 Nature of circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.4 Advice is sought from relevant personnel to ensure work is coordinated effectively with others
	1.5 Materials required for work are identified and obtained in accordance with workplace procedures
	1.6 Plant, equipment, tools, testing devices and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
2 Solve electrical problems on network apparatus in a remote community	**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 Need to test or measure live electrical components is determined in accordance with workplace procedures
	2.3 Circuits are checked and isolated in accordance with job requirements and workplace procedures
	2.4 Established methods are used to solve electrical problems from measured and calculated values as they apply to remote community network apparatus
	2.5 Unplanned events in the solving of electrical problems in remote community network apparatus are responded to in accordance with workplace procedures
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services in accordance with sustainable energy practices and workplace procedures

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3 Complete work and document problem solving activities	**3.1** WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	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 personnel 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS32A Solve electrical problems in remote community network 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 UETTDRIS32 Solve electrical problems in remote community network 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
- applying work procedures and instructions as they apply to risk control measures
- 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
- dealing with accidents and emergencies within the scope of responsibility
- altering an existing circuit to comply with specified operating parameters
- providing solutions derived from measurements and calculations to electrical problem in remote communities
- following accepted industry workplace procedures and instructions for remote communities
- determining the correct operation of remote community network systems
- diagnosing and providing solutions as they apply to remote community network systems.
- identifying predictable problems including at least three (3) of the following:
  - hi/low volts
  - high resistance
  - low resistance
  - fault current (fuses)
  - kilowatt hour meter faults (no supply, reverse polarity, etc)
  - streetlight faults
- 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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- parallel circuits, including:
  - schematic diagram of a single-source direct current (d.c.) parallel circuit
  - major components of a parallel circuit (power supply, loads, connecting leads and switch)
  - applications where parallel circuits are used in the remote community electricity supply industry (ESI)
  - 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
  - calculation of the total resistance of a parallel circuit
  - calculation of the total current of a parallel circuit
  - calculation of the total voltage of a parallel circuit
  - 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
- series/parallel circuits, including:
  - schematic diagram of a single-source d.c. series/parallel circuit
  - major components of a series/parallel circuit (power supply, loads, connecting leads and switch)
  - applications where series/parallel circuits are used in the remote community ESI
  - 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)
  - calculation of the total resistance of a series/parallel circuit
  - calculation of the total current of a series/parallel circuit
  - calculation of the total voltage and the individual voltage drops of a series/parallel circuit
  - 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
  - voltage, current, resistances or power dissipated from measured values of any two of these quantities
- 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
  - effect the change in length has on the resistance of a conductor
  - effect 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
  - using digital and analogue ohmmeter to measure the change in resistance of different types of conductive materials (copper and aluminium) when those materials undergo a change in type of material length, cross-sectional area and temperature
- effects of meters in a circuit, including:

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- selecting an appropriate meter in terms of units to be measured, range, loading effect, accuracy and safety category of meters for a given application
- instruments used in the field to measure voltage and current, and the typical circumstances in which they are used
- hazards involved in using electrical instruments and the safety control measures that should be taken
- operating characteristics of analogue and digital meters
- correct techniques to read the scale of an analogue meters and how to reduce the 'parallax' error
- types of voltmeters used in the ESI– bench type, clamp meter and multimeter
- purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter
- types of voltage indicator testers (e.g. LED, neon, solenoid, volt-stick and series tester) and the purpose of each voltage indicator tester
- operation of various voltage indicator testers
- advantages and disadvantages of each voltage indicator tester
- various types of ammeters used in the ESI industry (bench, clamp meter and multimeter)
- the purpose of an ammeter and the correct connection (series) of an ammeter into a circuit
- the reasons why 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
- connect an analogue/digital voltmeter into a circuit ensuring the polarities are correct and take various voltage readings
- demonstrate the loading effect of various voltmeters when measuring voltage across various loads
- use a variety of voltage indicator testers to detect the presence of various voltage levels
- connect an analogue/digital ammeter into a circuit ensuring the polarities are correct and take various current readings
- steps and procedures for the safe use, care and storage of electrical instruments

- resistance measurement, including:
  - identification of instruments used in the field to measure resistance (including insulation resistance) and the typical circumstances in which they are used
  - the purpose of an insulation resistance (IR) tester
  - the parts and functions of various analogue and digital IR tester (selector range switch, zero ohms adjustment, battery check function, scale and connecting leads)
  - reasons why the supply must be isolated prior to using the IR tester
  - where and why the continuity test would be used in an ESI systems
  - where and why the insulation resistance test would be used in an ESI system
  - the voltage ranges of an IR tester and where each range may be used. e.g. 250 V d.c, 500 V d.c & 1000 V d.c
  - the AS/NZS 3000:2018 Wiring Rules requirements – continuity test and insulation resistance test
  - the purpose of regular IR tester calibration

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  - the correct methods of storing the IR tester after use
  - calibration checks on an IR Tester
  - measurement of low values of resistance using an IR tester continuity functions
  - measurement of high values of resistance using an IR tester insulation resistance function
  - the volt-ammeter (short shunt and long shunt) methods of measuring resistance
  - calculation of resistance values using voltmeter and ammeter reading (long and short shunt connections)
  - measurement of resistance using volt-ammeter methods
- capacitors and capacitance, including:
  - basic construction of standard capacitor, highlighting the plates, dielectric and connecting leads
  - different types of dielectric material and each dielectric's relative permittivity
  - identification of various types of capacitors commonly used in the ESI (fixed value capacitors -stacked plate, rolled, electrolytic, ceramic, mica and variable value capacitors – tuning and trimmer)
  - circuit symbol of various types of capacitors - standard; variable, trimmer and polarised
  - terms: capacitance (C), electric charge (Q) and energy (W)
  - unit of capacitance (Farad), electric charge (Coulomb) and energy (Joule)
  - factors affecting capacitance (the effective area of the plates, the distance between the plates and the type of dielectric) and explain how these factors are present in all circuits to some extent
  - how a capacitor is charged in a d.c. circuit
  - behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves
  - the term time constant and its relationship to the charging and discharging of a capacitor
  - calculation of quantities from given information - capacitance (Q = VC); energy (W =½CV2); voltage (V = Q/C)
  - connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit
- handling and testing capacitors, 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
  - effects on the total capacitance of capacitors connected in series
  - common faults in capacitors
  - testing of capacitors to determine serviceability
  - application of capacitors in the ESI industry
- magnetism, including:

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- magnetic field pattern of bar and horse-shoe magnets
- magnets attraction and repulsion when brought in contact with each other
- common magnetic and non-magnetic materials and groupings (diamagnetic, paramagnetic and ferromagnetic materials)
- principle of magnetic screening (shielding) and its applications
- practical applications of magnets

- electromagnetism, including:
  - conventions representing direction of current flow in a conductor
  - magnetic field pattern around a single conductor and two adjacent conductors carrying current
  - using the right hand rule to determine the direction of magnetic field around a current carrying conductor
  - direction of force between adjacent current carrying conductors
  - effect of current, length and distance apart on the force between conductors (including forces on bus bars during fault conditions)
  - magnetic field around an electromagnet
  - using the right hand rule to determine the direction of magnetic field around a current carrying coil
  - magnetomotive force (m.m.f.) and its relationship to the number of turns in a coil and the current flowing in the coil
  - practical applications of electromagnets
- electromagnetic induction, including:
  - principle of electromagnetic induction (Faraday's law of electromagnetic induction)
  - applying Fleming's right hand rule to a current-carrying conductor under the influence of a magnetic field
  - calculation of induced electromagnetic force (e.m.f). in a conductor given the conductor length, flux density and velocity of the conductor
  - calculation of induced e.m.f. in a coil given the number of turns in a coil and the rate of change of flux
  - calculation of force on a conductor given the flux density of the magnetic field, length of the conductor and the current being carried by the conductor
  - Lenz's law
  - applications of electromagnetic induction
- inductance, including:
  - construction of an inductor, including a bifilar winding inductor
  - Australian Standard circuit diagram symbol for the four types of inductor
  - effect of physical parameters on the inductance of an inductor
  - common types of inductor cores
  - applications of the different types of inductors
  - definition of terms self-induction, inductance and mutual inductance
  - calculation of value of self-induced e.m.f. in a coil

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  - mutual induction occurs between two coils
  - practical applications for the effects of self and mutual induction
  - undesirable effects of self and mutual induction
- magnetic devices, including:
  - construction, operation and applications of relays
  - construction, operation and applications of contactors
  - magnetic methods used to extinguish the arc between opening contacts
  - construction, operation and applications of Hall effect devices
  - construction, operation and application of magnetic sensing 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 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 solving electrical problems in remote community network apparatus
- 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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UETTDRIS33 Solve electrical problems in remote community network 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 solve electrical problems in remote community network systems in the electricity supply industry (ESI).

It includes solving electrical problems on network systems in a remote community, completing work safely, documenting problem-solving activities and providing solutions to predictable problems on remote community network systems. It also includes working safely; diagnosing problems; applying problem-solving procedures; and using voltages, currents and resistance measuring devices to provide solutions derived from measurements and calculations to predictable circuit/systems problems.

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

UEENEEE103A Solve problems in ELV single path circuits

UETTDRIS32 Solve electrical problems in remote community network apparatus

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

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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 solve electrical problems on network systems in a remote community	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for work are obtained and confirmed
	1.2 Hazards are identified, WHS/OHS risks assessed and control measures identified in accordance with workplace procedures
	1.3 Circuit problems are obtained from documentation or relevant personnel to determine scope of work
	1.4 Advice is sought from relevant personnel to ensure work is coordinated effectively with others
	1.5 Materials required for work are identified and obtained in accordance with workplace procedures
	1.6 Plant, equipment, tools, testing devices and personal protective equipment (PPE) required for work is identified, obtained and confirmed in working order
2 Solve electrical problems on network systems in a remote community	**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 Need to test or measure live electrical components is determined in accordance with workplace procedures
	2.3 Circuits are checked and isolated in accordance with job requirements and workplace procedures
	2.4 Electrical system problems are solved from measured and calculated values
	2.5 Unplanned events in solving electrical problems in remote community network systems are responded to in accordance with workplace procedures
	2.6 Problems are solved without damage to apparatus, circuits and systems, the surrounding environment and/or services in accordance with sustainable energy

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		practices and workplace procedures
3 Complete work and document problem-solving activities	**3.1**	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	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 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 UETTDRIS33A Solve electrical problems in remote community network 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 UETTDRIS33 Solve electrical problems in remote community network 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
- applying work procedures and instructions as they apply to risk control measures
- participation 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
- dealing with accidents and emergencies within the scope of responsibility
- altering an existing circuit to comply with specified operating parameters
- following accepted industry workplace procedures and instructions for remote communities
- determining the correct operation of remote community network systems
- diagnosing and providing solutions as they apply to remote community network systems.
- identifying predictable problems including at least three (3) of the following:
  - hi/low volts
  - high resistance
  - low resistance
  - fault current (fuses)
  - kilowatt hour meter faults (no supply, reverse polarity, etc)
  - streetlight faults
- dealing with unplanned events on at least (1) one 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:

- alternating current (a.c.) quantities, including:

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  - sine, cosine and tangent ratios of a right-angle triangle
  - Pythagoras theorem to a right-angle triangle
  - use of the cathode ray oscilloscope (CRO) to measure direct current (d.c.) and a.c. voltage levels
  - sinusoidal voltage generated by a single turn coil rotated in uniform magnetic fields
  - terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', and 'root-mean-square (r.m.s.) value', in relation to a sinusoidal waveform
  - calculation of the instantaneous value of induced voltage of a generated sinusoidal waveform
  - measurement of instantaneous, peak and peak-to-peak values and the period of a sinusoidal waveform
  - calculation of r.m.s. value and frequency of a sinusoidal waveform from values of peak voltage and period
- phasor diagrams, including:
  - purpose of phasor diagrams
  - 'in-phase', 'out-of-phase', 'phase angle' 'lead' and 'lag'
  - phase angle between two or more alternating quantities from a given sinusoidal waveform diagram
  - convention for representing voltage, current and the reference quantity in a phasor diagram
  - drawing phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current
  - determination of phase relationship between two or more sinusoidal waveforms from a given diagram and measurements
- single element a.c. circuits, including:
  - setting up and connecting a single-source resistive a.c. circuit and taking voltage and current measurements to determine the resistance
  - determining the voltage, current resistances from measure of given values of any two of these qualities
  - relationship between voltage drops and current in resistive a.c. circuits
  - applications of resistive a.c. circuits
  - defining ‘inductive reactance’
  - calculation of inductive reactance for a given inductor and the relationship between inductive reactance and frequency
  - applying Ohm’s law to determine voltage, current of inductive reactance in a purely inductive a.c. circuit given any two to these quantities
  - applications of inductive a.c circuits
  - calculation of capacitive reactance
  - applying Ohm’s law to determine voltage, current or capacitive reactance in a purely capacitive a.c circuit given any two of the quantities
  - applications of capacitive a.c circuits
- impedance a.c. circuits, including:

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  - impedance and impedance triangle
  - determining the impedance, current and voltages for a series a.c circuit
  - drawing and labelling the impedance triangle for a series resistor–capacitor (RC) circuit
  - examples of capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current
  - drawing the equivalent circuit of a practical inductor
  - examples of inductive components in power circuits and systems and their effect on the phase relationship between voltage and current
- power in an a.c. circuit, including:
  - difference between true power, apparent power and reactive power and the units in which these quantities are measured
  - drawing the power triangle to show the relationships between true power, apparent power and reactive power
  - defining the term power factor and phase angle
  - methods used to measure single phase power, energy and demand
- power factor improvement, including:
  - effects of low power factor
  - requirements for power factor improvement
  - methods used to improve low power factor of an installation
  - local supply authority and AS/NZS 3000:2018 Wiring rules requirements regarding the power factor of an installation and power factor improvement equipment
- harmonics effect in a.c. systems, including:
  - term harmonic in relation to the sinusoidal waveform of an a.c. power system
  - sources in a.c. systems that produce harmonics
  - problems that may arise in a.c. circuits as a result of harmonics and how these are overcome
  - methods and test equipment used to test for harmonics
  - methods used to reduce harmonics in a.c. power system
- three phase systems, including:
  - features of a multiphase system
  - comparison of voltages generated by single and multi-phase alternators
  - reasons for the adoption of three phases for power systems
  - how three phases are generated in a single alternator
  - calculation of root mean square (r.m.s.) value of voltage generated in each phase given the maximum value
  - relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each
  - term phase sequence (also, referred to as phase rotation)
  - determining the phase sequence of a three-phase supply
- three phase star-connections, including:
  - connecting a three-phase star-connection load

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    - phase relationship between line and phase voltages and line and phase currents of a star-connected system
    - determining the r.m.s. value of line and phase voltage given any one of these quantities
    - determining the r.m.s. value of line and phase current given any one of these quantities
    - terms balanced load and unbalanced load
    - examples of balanced and unbalanced loads in typical power systems
- three phase four wire systems, including:
    - purpose of the neutral conductor in three phase four wire systems
    - determining 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
- three phase delta-connections and interconnected systems, including:
    - connecting three phase delta loads
    - phase relationship between line and phase voltages and line and phase currents of a delta-connected system
    - determining the r.m.s. value of line and phase voltage given any one of these quantities
    - determining the r.m.s. value of line and phase current given any one of these quantities
    - limitations and uses of open delta connections
    - example of loads in typical power systems
    - drawing the typical combinations of three phase interconnected systems using star-connections and a delta connection
    - relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta connections
- fault loop impedance, including:
    - term fault loop impedance of an a.c. power system
    - measuring fault loop impedance of typical circuits
    - procedures for testing fault loop impedance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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:

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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 for solving electrical problems in remote community network systems
- 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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UETTDRIS34 Install and replace energy meters and associated equipment in remote communities

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 replace whole current energy meters and associated equipment in remote communities in the electricity supply industry (ESI).

It includes completing the installation and replacement of whole current energy meters and associated equipment, identifying faults, and ascertaining normal functions of meters and associated equipment.

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

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

UEENEEK101A Maintain safety and tidiness of remote area power supply systems

UEENEEK102A Work safely with remote area power supply systems

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

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 for installation and replacement of energy meters and associated equipment	**1.1** Work plan, construction plans, drawings, workplace procedures and material lists are received, confirmed and communicated with relevant personnel
	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 installing and replacing energy meters and associated equipment 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 identified in accordance with workplace procedures
	1.6 Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.8 Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out the installation and replacement of energy meters and associated	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace

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equipment		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	Installation and replacement of whole current energy meters and associated equipment is completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4	Installation and/or replacement of whole current energy meters and associated equipment is performed, including wiring, testing, programming and sealing of meters and associated equipment in accordance with job requirements and workplace procedures
	2.5	Unplanned events are responded to in accordance with workplace procedures
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete the installation and replacement of energy meters and associated equipment	**3.1**	Completed work is checked against works 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 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

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 UETTDRIS34A Install and replace energy meters and associated equipment in remote communities.

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 UETTDRIS34 Install and replace energy meters and associated equipment in remote communities

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
- installing and replacing any one (1) of the following whole current energy meters and associated equipment:
  - induction disk energy meter
  - electronic energy meters
  - maximum demand meters
  - electronic summators
- installing at least one (1) of the following associated equipment:
  - service fuses
  - service links
  - meter boards
  - meter panels
- installing at least one (1) of the following associated equipment:
  - time switches
  - frequency injection relays
  - controlled output meters
  - contactors
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and replacement of energy meters and associated equipment

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- construction, operation and selection of whole current energy meters (single, polyphase, pre-payment, demand, induction and electronic)
- construction, operation and selection of associated equipment-service protection device, high rupturing capacity (HRC), circuit breaker, meter boards, main switch, meter enclosure and service links
- metering arrangements - direct metering, distributed master metering, multiple master metering, plug-in metering, multiple earth neutral (MEN) system, and typical cable routes through buildings
- cable types and applications -cable construction, sizes and ratings and requirements for protection and supporting cables
- installation tools and equipment required
- installation and removal of energy meters - stripping cable correctly, need for sound terminations, wiring meter position correctly, fitting service protection device (SPD), fitting meter boards and fitting meters
- testing procedures - continuity testing, insulation testing, polarity testing, phase sequence testing, neutral integrity testing and meter functionality testing
- completing energy meter documentation
- customer education on energy meters
- techniques for the maintenance of energy metering (fault finding, fault rectification, meter reading and tariff changes).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 installing and replacing whole current energy meters and associated equipment in remote communities
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UETTDRIS35 Perform remote community network field switching 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 remote community network field switching to a given schedule in the electricity supply industry (ESI).

It includes preparing, performing and completing low voltage (LV) field switching to a given schedule, using circuit breaking and isolation devices.

It also includes using LV distribution systems in remote community situations, communicating with relevant personnel, isolating electrical equipment, paralleling circuits, proving the area is de-energised and earthed, issuing/accepting electrical permits and returning 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

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

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

UEENEEK101A Maintain safety and tidiness of remote area power supply systems

UEENEEK102A Work safely with remote area power supply systems

UETTDREL12 Operate plant and equipment near live electrical conductors and 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 for LV field switching to a given schedule	**1.1** Switching and work schedules, construction 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 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 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 authorisation is obtained to perform work in accordance with job 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

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	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 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 requirements and established procedures
	2.6	Unplanned events occurring during LV field switching to a given schedule are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete LV field switching to a given schedule	**3.1**	Completed work is checked against switching 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 are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures

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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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS35A Perform remote community network field switching 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 UETTDRIS35 Perform remote community network field switching 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 the following:
  - approvals/clearances
  - access authority/permits
- using any two (2) of the following specialist testing devices:
  - voltage detectors
  - polarity testers
  - phase rotation indicators
- operating low voltage (LV) switchgear, including any 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
  - high voltage (HV) network interconnectors source of 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
  - 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
- role of the HV switching operator
- procedures for obtaining correct HV switching authorisation, including:
  - identification of WHS/OHS hazards, and assessing and controlling risks
  - safety procedures and precautions
  - safe approach distances
  - 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, and 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

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  - 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
  - isolation procedures and proving dead/de-energised
  - earthing procedures
  - emergency fault procedures
  - energisation procedures
- application and function of 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 performing remote community network field switching 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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UETTDRIS36 Install and maintain low voltage services in remote communities (overhead)

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 low voltage (LV) services in remote communities (overhead) in the electricity supply industry (ESI).

It includes the installation, maintenance and connection of LV overhead service lines and associated equipment between the connection point and the point of supply.

It also includes the repair and replacement of service cables, service fuses and the replacement and repair of service hardware, and the identification and rectification of faults. It also covers insulation, voltage, phase rotation and polarity testing.

All installation and maintenance of LV overhead services in remote communities must be undertaken in a non-energised (dead) environment other than for testing purposes.

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

UEENEEE103A Solve problems in ELV single path 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

UEENEEK101A Maintain safety and tidiness of remote area power supply systems

UEENEEK102A Work safely with remote area power supply systems

UEENEEK116A Maintain and repair remote area power generation facilities

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UEENEEK120A Maintain operation of remote area power generation plant

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS32 Solve electrical problems in remote community network apparatus

UETTDRIS33 Solve electrical problems in remote community network systems

UETTDRIS99 Test and verify distribution remote area installations

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 install and maintain LV overhead services in remote communities	**1.1** Work plan, construction plans, drawings, workplace procedures and material lists are received, confirmed and communicated with relevant personnel
	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 the installation and maintenance of LV overhead services and associated equipment 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 identified and implemented in accordance with workplace procedures

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	1.6	Relevant work permits are obtained and signed 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 installation and maintenance of LV overhead services in remote communities	**2.1**	Implemented hazard control measures are monitored in accordance with workplace procedures
	2.2	WHS/OHS, sustainable energy and environmental principles and practices are applied 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	Remote community electrical network equipment is isolated, proved de-energised and earthing equipment installed, as required, in accordance with workplace procedures
	2.5	LV field switching is performed in accordance with a given schedule and workplace procedures
	2.6	Installation and maintenance of LV overhead services, including mains, are completed in accordance with job requirements, work permits and workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures
	2.8	Earthing equipment is removed and remote community overhead network equipment is re-energised and returned to service in accordance with workplace procedures
	2.9	LV overhead services are tested in accordance with job requirements and workplace procedures

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	2.10	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of LV overhead services in remote communities	**3.1**	Completed work is checked against works schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	WHS/OHS and environmental incidents/accidents and injuries 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 are, where appropriate, are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are relinquished and signed off in accordance with workplace procedures
	3.6	Work records, reports and documentation are completed and relevant personnel 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS36A Install and maintain low voltage services in remote communities (overhead).

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Links

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Assessment Requirements for UETTDRIS36 Install and maintain low voltage services in remote communities (overhead)

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
- connecting low voltage (LV) overhead, including at least two (2) of the following:
  - overhead service line (three phase) *
  - overhead service line (single phase)
  - overhead service line (two phase)
  - (* must do)
- installing LV overhead associated equipment, including at least one (1) of the following:
  - service fuse
  - circuit breakers (pole)
  - service link
- testing LV overhead service connections, including all the following:
  - polarity test *
  - phase rotation test
  - continuity test
  - voltage test
  - (* must do)
- connecting LV overhead services, including at least one (1) of the following:
  - aluminium LV mains
  - copper LV mains
  - LV aerial bundled cable (ABC) mains
- 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

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the requirements of the elements and performance criteria and include knowledge of:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation, maintenance and connection of LV overhead service lines and associated equipment
- types, sizes and characteristics of LV overhead services -two-core, three-core, four-core, cable cross-sectional area of conductors, current ratings and cable insulation materials
- types and characteristics of LV service associated equipment - connectors, insulation pieing connectors (IPC's), service termination devices, fuse holders, fuses, service poles, point-of-attachment brackets and mains connection boxes
- requirements prior to the installation of overhead service - service documentation, minimum clearances to assets and ground, location of attachments, relevant electrical access permit, maximum span lengths and service cable tension and multiple earth neutral (MEN) system
- types of installation plant, equipment and tools -elevated work platform (EWP), ladders, service cable puller and tension tool, stripping tool, ABC spanner, ABC spreader, spanners and screwdrivers
- installation techniques - methods of stringing, tensioning and terminating, and effect of poor connections
- testing and commissioning overhead services - continuity testing, insulation testing, polarity testing, phase sequencing and neutral integrity testing
- completing enterprise documentation
- techniques for the maintenance of overhead services - inspection, types of faults, diagnosis and repair of faults, and removing and replacing services and fuses.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 for installing and maintaining LV overhead services in remote communities
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for installing and maintaining overhead LV services in remote communities
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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UETTDRIS37 Install and maintain low voltage services in remote communities (underground)

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 low voltage (LV) services in remote communities (underground) in the electricity supply industry (ESI).

It includes installing and maintaining of LV underground services and associated equipment. It also includes completing installation and maintenance of LV underground services and associated equipment; connecting LV underground service lines and associated equipment (between the connection point and the point of supply - customers' premises); repairing and replacing service cables, service fuses and service hardware; identifying and rectifying faults, insulation and voltage; polarity testing and phase rotation.

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

UEENEEE103A Solve problems in ELV single path 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

UEENEEK101A Maintain safety and tidiness of remote area power supply systems

UEENEEK102A Work safely with remote area power supply systems

UEENEEK116A Maintain and repair remote area power generation facilities

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UEENEEK120A Maintain operation of remote area power generation plant

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS32 Solve electrical problems in remote community network apparatus

UETTDRIS33 Solve electrical problems in remote community network systems

UETTDRIS99 Test and verify distribution remote area installations

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 install and maintain LV underground services in remote communities	**1.1** Works schedules, construction 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 the installation and maintenance of LV underground services and associated equipment 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 identified in accordance with workplace procedures

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	1.6	Relevant work permits are obtained, understood and signed 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 installation and maintenance of LV underground services in remote communities	**2.1**	Implemented hazard control measures are monitored in accordance with workplace procedures
	2.2	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents 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	Remote community electrical network equipment is isolated, proved de-energised and earthing equipment installed, as required, in accordance with workplace procedures
	2.5	Installation and maintenance of LV underground services are completed in accordance with job requirements, work permits and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	LV underground services are tested in accordance with job requirements and workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of LV underground services in	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace

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remote communities	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 are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5 Relevant work permits are relinquished and signed off in accordance with workplace procedures
	3.6 Work records, reports and documentation are completed and relevant personnel 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS37A Install and maintain low voltage services in remote communities (underground).

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 UETTDRIS37 Install and maintain low voltage services in remote communities (underground)

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
- connecting low voltage (LV) underground services, including at least two (2) of the following:
  - underground pillar/pit connection (single phase)
  - underground pillar/pit connection (three phase*)
  - underground to overhead connection
  - (* must do)
- installing LV underground service protection devices, including at least one (1) of the following:
  - fuse units
  - circuit breakers
  - service links
- using specialist testing equipment, including at least four (4) of the following:
  - polarity test *
  - phase rotation test
  - continuity test
  - voltage test
  - insulation resistance test
  - (* must do)
- connecting LV underground service protection devices, including at least one (1) of the following:
  - aluminium LV cable
  - cross-linked polyethylene (XLPE) cable
  - copper LV cable
- 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 pertaining to the installation, maintenance and connection of LV underground service lines and associated equipment
- types, sizes and characteristics of LV underground services - two-core, three-core, four-core, cable cross-sectional area of conductors, current ratings and cable insulation materials
- types and characteristics of LV service associated equipment - conduit, jointing gloves, cable labelling, pillars and pits
- requirements prior to the installation of underground service - service documentation, minimum depths to assets in ground, relevant electrical access permit and multiple earthed neutral (MEN) system
- types of installation plant, equipment and tools - service cable puller, shovels, stripping tool, aerial bundled cable (ABC) spanner, ABC spreader, spanners and screwdrivers
- installation techniques - methods of laying cable, terminating and effect of poor connections
- testing and commissioning underground services - continuity testing, insulation testing, polarity testing, phase sequencing and neutral integrity testing
- completing enterprise documentation
- techniques for the maintenance of underground services - inspection, types of faults, diagnosis and repair of faults, and removing and replacing services and fuses.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 for installing and maintaining LV underground services in remote communities
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for installing and maintaining underground LV services in remote communities
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UETTDRIS38 Install and maintain public lighting systems in remote communities

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 public lighting systems in remote communities in the electricity supply industry (ESI).

It includes completing installation and maintenance of public lighting systems; inspecting, testing and commissioning of the system associated with the street lighting circuit, associated hardware and earthing system; and installing associated hardware, components, wiring and earthing system. Maintenance also includes working on energised LV overhead or underground public lighting systems, including diagnosis of faults and updating relevant system data and/or public lighting maintenance records.

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

UEENEEE103A Solve problems in ELV single path 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

UEENEEK101A Maintain safety and tidiness of remote area power supply systems

UEENEEK102A Work safely with remote area power supply systems

UEENEEK116A Maintain and repair remote area power generation facilities

UEENEEK120A Maintain operation of remote area power generation plant

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS32 Solve electrical problems in remote community network apparatus

UETTDRIS33 Solve electrical problems in remote community network systems

UETTDRIS99 Test and verify distribution remote area installations

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 installation and maintenance of public lighting systems	**1.1** Works schedules, construction 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 the installation and maintenance of public lighting systems 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and

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		signed 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 installation and maintenance of public lighting systems	**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	Installation and maintenance of public lighting systems are performed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Excavation/foundation construction is inspected and confirmed as being in accordance with workplace procedures
	2.5	Associated hardware, fittings and control gear are installed in accordance with workplace procedures
	2.6	Earthing systems and street lighting circuits are installed in accordance with workplace procedures
	2.7	Inspection of public lighting and associated hardware is conducted to determine compliance with job requirements and workplace procedures
	2.8	Maintenance, including repair and/or replacement of the public lighting system, is performed in accordance with jobs schedule and workplace procedures
	2.9	Unplanned events are responded to in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance

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		with workplace procedures
3 Complete installation and maintenance of public lighting 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	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 are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are signed off and the public lighting system is returned to service or disposed of 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 UETTDRIS38A Install and maintain public lighting systems in remote communities.

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 UETTDRIS38 Install and maintain public lighting systems in remote communities

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
- installing and maintaining public lighting systems on poles/columns including at least one (1) of the following:
  - wood
  - concrete
  - steel
  - composite
- installing lanterns/luminaires, including at least two (2) of the following:
  - high pressure mercury vapour
  - low pressure and high pressure sodium vapour
  - fluorescent
  - quartz-halogen
- using specialist testing devices, including at least three (3) of the following:
  - voltage detectors*
  - insulation resistance testers
  - clamp-on ammeters
  - continuity testers
  - fault indicators
  - (* must use)
- 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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- standards, codes, legislation, supply authority regulations, local government and/or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
- types of lighting systems - overhead and underground
- safety precautions specific to working on street lighting - safe working practices and procedures, working at heights, working in confined spaces, permit to work systems and isolation procedures
- basic public lighting principles - electromagnetic spectrum, principles of colour, behaviour of light and factors that affect illumination
- requirements for the use of enterprise construction manuals, systems, diagrams/plans and drawings - constructing streetlight, street lighting circuits and earthing system
- types of tools and equipment used for installation and maintenance
- types and function of lanterns/luminaries/lamps, control equipment, poles and associated hardware used for street lighting - high pressure mercury vapour, low pressure and high pressure sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches, contactor boxes, brackets and street lights standards
- techniques for the installation of street lighting systems
- techniques for the inspection, testing and commissioning of street lighting systems
- techniques for the maintenance of street lighting systems - diagnosing of faults; removing, repairing, replacement and cleaning of public lighting and associated hardware; and controlling and switching of lighting 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 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 installing and maintaining public lighting systems in remote communities
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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UETTDRIS41 Install network infrastructure electrical 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 install network infrastructure electrical equipment in the electricity supply industry (ESI).

It includes terminating and/or connecting equipment, conducting relevant pre-commissioning tests involving the equipment/system, and interpreting tests against agreed specifications.

Electrical equipment includes but is not limited to transformers, fuse switches, drop out switches, sectionalisers, links, surge arrestors, gas filled and/or oil filled switches, which are relevant to transmission, distribution and rail networks.

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

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Transmission Overhead Pathway Group
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
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
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
UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

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 for installation of network infrastructure electrical equipment	**1.1** Work schedules, construction plans and drawings, material lists and workplace procedures 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 the installation of electrical equipment (network infrastructure) 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, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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 Install network infrastructure electrical equipment	**2.1** WHS/OHS, environmental requirements and workplace procedures are monitored and followed to reduce incidents in the workplace
	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 Installation of network infrastructure electrical

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		equipment is completed in accordance with work schedule, construction plans and drawing and workplace procedures
	2.4	Unplanned events in the installation of electrical equipment are responded to in accordance with workplace procedures
	2.5	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation of network infrastructure electrical equipment	**3.1**	Completed work is checked/tested 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 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 UETTDRIS41A Install network infrastructure electrical

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equipment.

Links

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Assessment Requirements for UETTDRIS41 Install network infrastructure electrical 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
- installing any three (3) of the following:
  - fuse switches
  - dropout fuses
  - sectionalisers
  - disconnectors
  - links
  - fuses
  - surge arrestors
- installing network infrastructure electrical equipment for at least one (1) of the following switchgear types:
  - reclosers
  - motorised switches
  - gas filled switches
  - ring main units
  - line fault indicators
  - oil filled switches
  - air break switches
- installing network infrastructure electrical equipment for at least one (1) of the following equipment types:
  - transformers
  - reactors
  - regulators
  - capacitors
- using specialist testing equipment including at least three (3) of the following:

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- voltage detectors
- phasing equipment
- clip-on ammeters
- insulation resistance testers
- recording meters
- earth resistance tester
- 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:

- relationship between the substations within an overall power system, such as:
  - purpose, location in relation to load centres, layout of high voltage (HV) equipment within the substation and auxiliary equipment
- characteristics of a power transformer, such as:
  - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
- auxiliary equipment used on transformers encompassing:
  - function and basic operation
- maintenance of a power transformer, such as
  - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
- characteristics of a reactor, including:
  - description and purpose
- types and function of various switchgear, such as:
  - 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, such as:
  - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- installation procedures for switchgear and equipment, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - assembly and erecting procedures
  - earthing requirements and techniques
  - pole mounted locations
- testing and commissioning, including:
  - electricity supply industry (ESI) standards 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 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.

Evidence should show demonstrated competency working at heights, in limited spaces, with different structural/construction types and method and in a variety of environments.

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 maintaining network infrastructure electrical equipment
- 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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UETTDRIS42 Maintain network infrastructure electrical 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 maintain network infrastructure electrical equipment in the electricity supply industry (ESI).

It includes the maintenance of electrical equipment and associated hardware, including fuse switches, drop out switches, sectionalisers, links, surge arrestors, gas filled and/or oil filled switches that are relevant to transmission, distribution and rail traction networks. It also includes the repair and/or replacement of 'like for like' electrical equipment and associated hardware as well as the termination and/or connection of this equipment according to requirements, and sampling of insulating oils.

It also includes identifying faults, performing pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications.

It excludes the energisation of the equipment maintained in a highly complex, interdependent and interconnected electricity supply network system, where the effects of unintended consequences on the system are high risk.

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

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UEENEEG101A Solve problems in electromagnetic devices and related circuits
UEENEEG102A Solve problems in low voltage a.c. circuits
UETTDREL11 Apply sustainable energy and environmental procedures
UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus
UETTDREL16 Working safely near live electrical apparatus
Transmission Overhead Pathway Group
UETTDRIS41 Install network infrastructure electrical equipment
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
UETTDRIS41 Install 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
UETTDRIS41 Install network infrastructure electrical equipment
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
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS55 Install and maintain low voltage underground services

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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 for maintenance of network infrastructure electrical equipment	**1.1** Works schedules, construction 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 the maintenance of electrical equipment (network infrastructure) 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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

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	1.9	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out maintenance of network infrastructure electrical equipment	**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	Maintenance of electrical equipment (network infrastructure) is completed in agreed timeframes, to quality standards and with minimum of waste in accordance with workplace procedures
	2.4	Maintenance, including repair and/or replacement of electrical equipment (network infrastructure), is performed in accordance with job schedule, work requirements and workplace procedures
	2.5	Unplanned events are responded to in accordance with workplace procedures
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete maintenance of network infrastructure electrical equipment	**3.1**	Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies 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 and electrical equipment (network infrastructure) is returned to service in accordance with workplace procedures
	3.6	Work records, reports and/or documentation 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS42A Maintain network infrastructure electrical 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 UETTDRIS42 Maintain network infrastructure electrical 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
- performing maintenance of network infrastructure electrical equipment using at least three (3) of the following:
  - fuse switches
  - dropout fuses
  - sectionalisers
  - disconnectors
  - links
  - fuses
  - surge arrestors
- using at least one (1) of the following:
  - reclosers
  - gas filled switches
  - ring main units
  - oil filled switches
  - air break switches
- maintaining network infrastructure electrical equipment for at least one (1) of the following equipment types:
  - transformers
  - reactors
  - regulators
  - capacitors
  - relays
  - line fault indicators
- using specialist testing equipment, including at least three (3) of the following:

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  - voltage detectors
  - phasing equipment
  - clip-on ammeters
  - insulation resistance testers
  - recording meters
  - earth resistance testers
- 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:

- types and function of various switchgear, such as:
  - 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, such as:
  - transformers, reactors, regulators, capacitors, relays, surge arrestors, fault indicators and mobile generators
- maintenance procedures for switchgear and equipment encompassing:
  - diagnosing and rectifying faults according to electricity supply industry (ESI) standards and procedures
- testing and commissioning encompassing:
  - ESI standards 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 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

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equipment (PPE) currently used in industry for maintaining network infrastructure electrical equipment
- 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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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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UETTDRIS46 Install and maintain ESI network infrastructure electrical 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 covers the installation and maintenance of electrical equipment, such as fuse switches, drop out switches, sectionalisers, links, surge arrestors, gas filled and/or oil filled switches, which are relevant to the transmission, distribution and rail networks.

It includes the termination/connection of the equipment in accordance with enterprise requirements, the repair and/or replacement of like-for-like electrical equipment and associated hardware, and sampling of insulating oils. It also encompasses the identification of faults, the relevant pre-commissioning tests involving the equipment/system and the interpretation of these tests against agreed specifications.

It excludes the energisation of the equipment maintained in a highly complex, interdependent and interconnected electricity supply network system, where the effects of unintended consequences on the system are high risk and appropriate personnel effect energisation.

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

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

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circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

UEENEEG108A Troubleshoot 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

UETTDREL16 Worksafely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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 the installation and maintenance of network infrastructure electrical	**1.1** Works schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection

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equipment

1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and/or maintenance of network infrastructure electrical equipment are obtained and confirmed for the purposes of the work to be performed

1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear according to established procedures

1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE) required for the job are obtained and confirmed in working order

1.8 Relevant personnel at worksite are confirmed current in first aid, pole top rescue and other related work procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work, where necessary

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures

1.12 Road signs, barriers and warning devices are positioned

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		in accordance with requirements
2 Carry out installation and maintenance of network infrastructure electrical equipment	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed, and currency according to requirements confirmed
	2.3	Essential knowledge and associated skills are applied in the safe installation of network infrastructure electrical equipment to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.4	Electrical equipment and associated hardware are positioned, secured and terminated/connected in accordance with requirements and established procedures
	2.5	Maintenance, including repair and/or replacement of network infrastructure electrical equipment, is carried out in accordance with the work schedule and requirements/established procedures
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.7	Unplanned events in the installation of electrical equipment (network infrastructure) are undertaken within the scope of established procedures
	2.8	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.9	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of network infrastructure electrical equipment	**3.1**	Work undertaken is checked/tested against works schedule for conformance with requirements and anomalies reported in accordance with established procedures

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3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permit(s) are signed off and electrical equipment (network infrastructure) are returned to service in accordance with requirements

3.6 Works completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate 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 UETTDRIS46A Install and maintain ESI network infrastructure electrical 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 UETTDRIS46 Install and maintain ESI network infrastructure electrical 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
- installing and maintaining any three (3) of the following:
  - fuse switches
  - dropout fuses
  - sectionalisers
  - disconnectors
  - links
  - fuses
  - surge arrestors
- installing and maintaining any one (1) of the following:
  - reclosers
  - motorised switches
  - gas filled switches
  - ring main units
  - line fault indicators
  - oil filled switches
  - air break switches
- installing and maintaining any one (1) of the following:
  - transformers
  - reactors
  - regulators
  - capacitors
  - relays
  - line fault indicators

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    - with regards to the above incorporate any three (3) of the following:
        - voltage detectors
        - phasing equipment
        - clip-on ammeters
        - insulation resistance testers
        - recording meters
        - earth resistance tester
- 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:

- mathematics techniques encompassing:
    - calculations involving fractions, decimals, ratios and proportions
    - calculations involving area, volume, mass and density
    - calculations involving transposition and substitution of formulae
    - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
    - identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque and pressure
    - applications of the International System of Units (SI) units
    - the relationship between work, power and energy
    - behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces, and determining the sag in a catenary conductor and the force applied at each end
    - fundamentals of the basic laws of fluid mechanics
- materials properties encompassing:
    - identification and classification of engineering materials material properties
    - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion; and the properties of timbers
- basic rigging techniques encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches, and relevant certification and licensing (if required)
    - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
    - safe use of rigging equipment, tools and associated equipment - types, techniques and application
    - site inspection procedures - identifying hazards, assessing and controlling risks, and

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appropriate sequence of loading and unloading
    - determining the mass and dimensions of load
    - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan), ratings of wire ropes and slings, removing, repairing and replacing of damage parts
    - techniques for assembling and erecting power winches and capstans
    - checking the integrity of support structure - visual inspection of load connections
    - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, and load stability
- procedures in providing store support encompassing:
    - classification and identification of equipment, components and tools
    - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
    - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts and cable drum handling equipment
    - safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, and depot safety procedures
    - manufacturer and supplier information, including material safety data sheets (MSDS)
- generation systems encompassing:
    - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
    - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
    - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
    - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
    - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
    - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
    - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
    - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment

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  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors - types of low voltage (LV) and HV overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; and minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
  - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
  - requirements of persons prior to making bare-hand contact with dead LV mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
  - safe working practices - requirements to enable safe working on conductive poles, procedure to attach an on-site earthing device to de-energised LV and HV overhead circuit
- installation of poles and/or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, clearances between conductors, safe methods of erecting and stabling poles and-or structures and cross-arms
  - techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles, methods of strengthen poles, maintenance and replacement of HV

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insulators and cross-arms

- installation of LV electrical services encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings types of LV overhead services, methods of construction and installation, minimum clearances for overhead services to assets and structures, and types of installation equipment/tools
  - characteristics and applications of different types of cables - cable cross-sectional area of conductors, current rating and fuse type
  - techniques for maintenance of service installations - diagnosis and repair of faults
  - jointing and terminating methods - polymeric heat shrink materials, polymeric tape materials, energised and de-energised cables, connections to fuse boxes and pole top boxes
  - testing and commissioning procedures – inspection, polarity, voltage and phase sequence tests
  - construction types and structures for distribution and sub transmission lines
  - types, sizes and characteristics of overhead conductors
  - resources for the stringing and maintenance of conductors, - types of LV and HV overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; and minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and hardware, methods of stringing, tensioning and termination of LV and HV conductors
- powerline safety practices encompassing:
  - 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 procedures for 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 procedure 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

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- rescue victims from heights and confined spaces - planning and identifying procedures, establishing responses and developing techniques; involving external emergency services; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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

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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UETTDRIS48 Develop high voltage switching 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 covers the preparation of a basic switching schedule for interconnected high voltage (HV) network plant. It includes planning basic outages and taking into account loading of network components. It also includes the calculation of network loading conditions to ensure the network is operating within designed parameters.

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

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

UETTDRIS44 Perform HV field switching operation to a given schedule

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/plan to develop HV switching schedules	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and

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		identified for all worksites
	1.5	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE) required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.10	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
2 Carry out the development of HV switching schedules	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.3	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.4	Development of HV switching schedules is carried out in accordance with the work schedule and requirements

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		and/or established procedures
	2.5	Essential knowledge and associated skills are applied in the safe development of HV switching schedules to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete development of HV switching schedules	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Relevant work permits are signed off and plant is returned to service and client/customer advised in accordance with requirements
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS48A Develop high voltage switching 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 UETTDRIS48 Develop high voltage switching 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
- obtaining all the following:
  - approvals/clearances
  - access authorities
- completing at least one (1) of the following:
  - development of an interconnected switching schedule
  - development of a radial switching schedule
- completing all of the following:
  - planning of loading of network components, including standby generation
  - evaluating load parameters and effects on system, including paralleling and off-loading
  - identifying unexpected sources of energisation, e.g. – generators and uninterruptible power supply (UPS)
  - implementing earthing procedures to reduce induced voltages
  - authorising issuance of work permits
- 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:

- electrical equipment fundamentals used in the powerline industry encompassing:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - high voltage (HV) and low voltage (LV) equipment
  - characteristics, capabilities and application of powerline electrical equipment

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  - safety precautions with regards to using electrical equipment
  - techniques in pre-use inspection on the serviceability of electrical equipment
  - techniques in the general maintenance, care and storage of electrical equipment
  - identifying hazards, assessing and controlling risks associated with the use of electrical equipment
- HV switching principles encompassing:
  - 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, 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 effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (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 distribution transformer principles encompassing:
  - 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 encompassing:
  - application and function of SWER system components
  - circuit arrangement

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  - principle of operation
  - hazards and procedures associated with faulty SWER earth systems
  - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
  - 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 voice annunciated system and local control station
- HV system switching principles, including switching authorisation procedures, encompassing:
  - 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
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - 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 and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures and energisation procedures
- HV overhead and substation switching principles encompassing:
  - 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, and 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

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  - operation of HV overhead switching or indicating devices - fuses, disconnect fuses, load switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air breaks, 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; 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
  - 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
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - 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 encompassing:
  - 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 personal protection equipment (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

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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 drawings and documents encompassing:
    - 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 drawings encompassing:
    - 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 catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching 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 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, 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

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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UETTDRIS49 Develop low voltage switching 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 covers the preparation of a basic switching schedule for low voltage (LV) network. It includes planning basic outages and taking into account loading of network components. It also includes the calculation of network loading conditions to ensure the network is operating within design parameters.

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

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

UETTDRIS43 Perform low voltage field switching operation to a given schedule

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
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
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/plan to develop LV switching schedules	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

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	1.4 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.5 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.6 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.7 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.8 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
2 Carry out the development of LV switching schedules	**2.1** WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established 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 according to established procedures
	2.3 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.4 Development of LV switching schedules is carried out in accordance with the work schedule and requirements

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		and/or established procedures
	2.5	Essential knowledge and associated skills are applied in the safe development of LV switching schedules to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete development of LV switching schedules	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Relevant work permits) are signed off and plant is returned to service and client/customer advised in accordance with requirements
	3.3	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS49A Develop low voltage switching 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 UETTDRIS49 Develop low voltage switching 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
- obtaining all the following:
  - approvals/clearances
  - access authorities
- completing the following:
  - development of LV switching schedule to enterprise requirements
- completing all the following:
  - planning of loading of network components, including standby generation
  - evaluating load parameters and effects on system, including paralleling and off-loading
  - identifying unexpected sources of energisation, e.g. – generators, uninterruptible power supply (UPS) and solar
  - implementing earthing procedures to reduce induced voltages
  - authorising issuance of work-permits
- 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:

- electrical equipment fundamentals used in the powerline industry encompassing:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - high voltage (HV) and low voltage (LV) equipment
  - characteristics, capabilities and application of powerline electrical equipment
  - safety precautions with regards to using electrical equipment

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    - techniques in pre-use inspection on the serviceability of electrical equipment
    - techniques in the general maintenance, care and storage of electrical equipment
    - identifying hazards, and assessing and controlling risks associated with the use of electrical equipment
- installation of switchgear and associated equipment encompassing:
    - 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
- LV switching principles encompassing:
    - 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
- LV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - 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 and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- LV overhead and substation switching principles encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements

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applicable to LV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments; purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air-break 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; types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing
  - LV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a LV switching instruction encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator
  - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - 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

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management, and training and competency development - understanding and promotion

- enterprise-specific WHS/OHS instructions encompassing:
  - 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 drawings and documents encompassing:
  - 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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

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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UETTDRIS50 Coordinate power system permit procedures

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 coordination of work procedures that require the issue of electrical permits to work and other permits for working on major parts of the electrical network. It encompasses the analysis and coordination of all work activities planned to be undertaken within more or less the same time timeframe to ensure that the organisation's work safety and statutory requirements are complied with; the extent of power interruption, and hence inconvenience to customers, is minimised; and the effective utilisation of available resources, both from the organisation and from its contractors to ensure all planned activities are completed in a timely manner to specified standards and requirements.

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

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
UETTDRIS44 Perform HV field switching operation to a given schedule
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
UETTDRIS43 Perform low voltage field switching operation to a given schedule
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
UETTDRRT30 Perform to a given schedule rail traction switching operations
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

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UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS43 Perform low voltage field switching operation to a given schedule

UETTDRIS55 Install and maintain low voltage underground services

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

UETTDRSB39 Perform power system substation switching operation to a given schedule

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/plan to coordinate permit procedures	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination

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	1.2	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.4	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.5	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and applied in the coordination of permit procedures according to established procedures
	1.7	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.8	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
2 Carry out the coordination of permit procedures	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established 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 according to established procedures
	2.3	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to

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		requirements and/or established procedures
	2.4	Coordination of permit procedures is carried out in accordance with the work schedule and requirements and/or established procedures
	2.5	Essential knowledge and associated skills are applied in the safe coordination of permit procedures to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality like outcome is achieved for the client/customer and to a community/industry standard
3 Complete the coordination of permit procedures	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Relevant work permits are signed off and plant is returned to service and client/customer advised in accordance with requirements
	3.3	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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.

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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 UETTDRIS50A Coordinate power system permit procedures.

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 UETTDRIS50 Coordinate power system permit procedures

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
- completing all the following:
  - developing a permit schedule and/or permit issuing procedures
  - facilitating and coordinating the delivery and issuing of permits
- gathering, collating and confirming data on different worksites relevant to:
  - electrical network diagrams for the specific worksite
  - earth permits
  - safe working area
  - work to be carried out in confined space or in hazardous environment
  - specific outsourcing procedures
  - specific hazard identification
  - risk classification and management procedures
  - regulatory requirements, such as WHS/OHS and electrical safety
- completing all the following:
  - receiving and coordinating the cancellation of permits in readiness for restoration
  - conducting audits permit correctness procedures
- conducting at least two (2) of the following:
  - issuing other work permits, such as working in confined space, as required
  - coordinating permits
  - engaging and briefing contractors on electrical and other work permits
- 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

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the requirements of the elements and performance criteria and include knowledge of:

- coordinating access authority procedures encompassing:
  - specific-enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, as required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- high voltage (HV) switching principles encompassing:
  - 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, and purpose and procedures for operational forms, access authorities and permits
  - use and operation of equipment associated with HV overhead and substation equipment - test instruments, sticks, interrupters, 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

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and effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (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 distribution transformer principles encompassing:
    - 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 encompassing:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
    - 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 AT, dial up voice annunciated system and local control station
- HV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances (SAD), responsibilities and protocols, identifying switching

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resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures and energisation procedures
- LV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- HV overhead and substation switching principles encompassing:
    - legislation, standards, codes, legislation, 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 and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits and hazard/risk assessments; purpose and procedurse 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, air-breaks 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; 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
    - operate switching apparatus - identifying hazards, assessing and controlling risks

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associated with HV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures

- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to low voltage overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedures for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air-break 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; types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing
  - LV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths) and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- preparation of a LV switching instruction encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator

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  - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - 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 encompassing:
  - 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 drawings and documents encompassing:
  - 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 drawings encompassing:
  - 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 catalogues, and instruction/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution

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system symbols and feeder plans, and processes of updating switching 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 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, 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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UETTDRIS51 Coordinate and direct power system switching schedules

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 coordination and direction of switching the high voltage (HV) and low voltage (LV) system. It includes coordinating switching between operating authorities and HV customers. It also includes the direction of switching on the HV and LV electrical network.

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

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

UETTDRIS44 Perform HV field switching operation to a given schedule

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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
UETTDRIS43 Perform low voltage field switching operation to a given schedule
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
UETTDRRT30 Perform to a given schedule rail traction switching operations
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

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UETTDRIS43 Perform low voltage field switching operation to a given schedule

UETTDRIS55 Install and maintain low voltage underground services

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

UETTDRSB39 Perform power system substation switching operation to a given schedule

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/plan to coordinate and direct switching schedules	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established

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		procedures
	1.3	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
2 Carry out coordinate and direct switching schedules	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to

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		immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Coordination and direction of switching schedules are carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe coordination and direction of switching schedules to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete coordinate and direct switching schedules	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Relevant work permits are signed off and electrical plant is returned to service and client/customer advised in accordance with requirements
	3.4	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS51A Coordinate and direct power system switching schedules.

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 UETTDRIS51 Coordinate and direct power system switching schedules

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
- obtaining all the following:
  - approvals/clearances
  - access permits
- demonstrating all of the following:
  - switching direction
  - switching coordination
  - autonomy of working with network control
- 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:

- electrical equipment fundamentals used in the powerline industry encompassing:
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment - high voltage (HV) and low voltage (LV) equipment
  - characteristics, capabilities and application of powerline electrical equipment
  - safety precautions with regards to using electrical equipment
  - techniques in pre-use inspection on the serviceability of electrical equipment
  - techniques in the general maintenance, care and storage of electrical equipment
  - identifying hazards, and assessing and controlling risks associated with the use of electrical equipment
- installation of switchgear and associated equipment encompassing:

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  - 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 of 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
- LV switching principles encompassing:
  - 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 permits, operational procedures and earthing procedures
  - personnel protective equipment (PPE) for LV switching
- HV switching principles encompassing:
  - 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 procedures for operational forms, 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 effectiveness of operational earthing, acceptable industry procedures, PPE and HV switching techniques

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    - 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 distribution transformer principles encompassing:
    - 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 encompassing:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
    - 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 voice annunciated system and local control station
- HV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - 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 and procedures for coordination of operations

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    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, emergency fault procedures and energisation procedures
- LV system switching principles, including switching authorisation procedures, encompassing:
    - legislation, standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to system switching
    - requirements for the use of manuals, system diagrams/plans and drawings
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- coordinating and directing switching instructions encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
    - specific enterprise processes, policies and procedures to be followed
    - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
    - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
    - techniques in the effective utilisation of available resources
    - techniques in the coordination and directing of switching schedules instructions
    - relationship between the operating authorities and HV customers and operating agreements
    - techniques in coordinating and directing HV and LV switching of electrical networks
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
    - responsibilities of the switching operator
    - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
    - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
    - 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

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- role and responsibilities of the HV switching operator
- operational forms, access authorities and permits and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits and 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, air-breaks 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; 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
- 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

- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to LV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments; purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air-break 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; types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing

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  - LV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- preparation of a LV switching instruction encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator
  - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
  - 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 encompassing:
  - 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

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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 drawings and documents encompassing:
    - 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 drawings encompassing:
    - 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 catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching 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 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, 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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UETTDRIS52 Install and maintain poles, structures and associated hardware

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 poles, structures and associated hardware in the electricity supply industry (ESI).

It includes the installation of poles and/or structures and associated hardware, (excluding towers), which may consist of wood, steel, concrete or composite type material.

It also covers the fixing and/or securing of associated hardware as well as the repair and replacement of poles and/or structures.

It includes identifying and implementing a suitable traffic management plan.

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

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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 for installation and maintenance of poles, structures and associated hardware	**1.1** Work schedules, construction 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 the installation and maintenance of poles and/or structures and associated hardware 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 identified in accordance with workplace procedures
	1.6 Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7 Relevant work permits are obtained, understood and signed in accordance with workplace procedures
	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

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2 Carry out installation and maintenance of poles and/or structures and associated hardware	**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	Installation of poles and/or structures and associated hardware are completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Poles and/or structures and associated hardware to be installed are stabilised in accordance with workplace procedures
	2.5	Installation is assembled in accordance with construction plans, drawings and workplace procedures
	2.6	Maintenance, including repair and/or replacement of poles and/or structures, is performed in accordance with work schedule, job requirements and workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of poles, structures and associated hardware	**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 and poles and/or structures and their associated hardware are returned to

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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 UETTDRIS52A Install and maintain poles, structures and associated hardware.

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 UETTDRIS52 Install and maintain poles, structures and associated hardware

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
- installing at least one (1) of the following pole type and structures:
  - wood pole/structure
  - steel pole/structure
  - concrete pole/structure
  - composite pole/structure
- installing at least three (3) of the following associated hardware:
  - insulators
  - cross-arm braces
  - cross-arms
  - pole steps
  - shackle straps
  - earth leads
  - traction supports
  - traction registration
  - bonding
- using at least one (1) of the following pole stabilisation methods:
  - baulking
  - stays
  - concreting including foundation
- installing poles and structures using at least one (1) of the following:
  - crane
  - auger/erector
  - ‘A’ frame

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  - lifting beam
  - pole pikes
  - helicopter lift
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
  - characteristics and applications of different types of poles and associated hardware
- techniques for installing poles and associated hardware, including:
  - types of installation equipment/tools
  - excavation methods
  - types of footings/foundations
  - types of attachments
  - earthing systems
  - clearances between conductors
  - safe methods of erecting and stabling poles and/or structures and cross-arms
- techniques for maintenance of poles and associated hardware, including:
  - stabilisation techniques for unstable poles
  - methods of strengthen poles
  - maintenance and replacement of high voltage insulators and cross arms
- traffic management, such as:
  - purpose of traffic management and a power worker’s responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, procedures used to provide an effective traffic management scheme and the use of a two-way radio
- procedures for purchasing/ordering items, removing/dispatching items, stocktaking and record keeping.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles 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 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 installing and maintaining poles, structures and associated hardware
- 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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UETTDRIS53 Install and maintain power system public lighting

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, maintain, and repair power systems public lighting in the electricity supply industry (ESI).

It includes inspecting, testing and commissioning the system associated with street lighting circuit, the associated hardware, and the earthing system.

Maintenance may include work on energised low voltage (LV) overhead or underground public lighting systems, diagnosis of faults, updating relevant system data and or public lighting maintenance records. Installation will include the installation of, the associated hardware and components and, the wiring and earthing system.

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

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Transmission Overhead Pathway Group
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
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
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
UETTDRIS41 Install network infrastructure electrical equipment
UETTDRIS42 Maintain network infrastructure electrical equipment
UETTDRIS55 Install and maintain low voltage underground services

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

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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 installation and maintenance of public lighting systems	**1.1** Works schedules, construction 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 installation and maintenance of public lighting systems 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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 installation and maintenance of public lighting systems	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace procedures

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	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	Installation and maintenance of public lighting systems is completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Excavation/foundation construction is inspected in accordance with workplace procedures
	2.5	Associated hardware, fittings and control equipment are installed in accordance with workplace procedures
	2.6	Earthing systems and street lighting circuits are installed in accordance with workplace procedures
	2.7	Inspection of public lighting and associated hardware is performed in accordance with workplace procedures
	2.8	Maintenance, repair and/or replacement of public lighting systems are performed in accordance with job schedule and workplace procedures
	2.9	Unplanned events are responded to in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of public lighting 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	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 and the public lighting system is returned to service in accordance with workplace procedures

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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 UETTDRIS53A Install and maintain power system public lighting.

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 UETTDRIS53 Install and maintain power system public lighting

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
- installing and maintaining public lighting poles/columns at least one (1) of the following:
  - wood
  - concrete
  - steel
  - composite
- installing or and maintaining public lighting lanterns/luminaires, including at least two (2) of the following:
  - high pressure mercury vapour
  - low pressure and high pressure sodium vapour
  - fluorescent
  - quartz-halogen
- using specialist testing equipment, including at least three (3) of the following:
  - voltage detectors*
  - insulation resistance testers
  - clamp-on ammeters
  - continuity testers
  - fault indicators
  - (* must use)
- 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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- standards, codes, legislation, supply authority regulations, local government and/or enterprise requirements pertaining to the installation and maintenance of public lighting systems and associated equipment
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
  - street lighting circuits
  - earthing system
- types of tools and equipment used for installation and maintenance
- types and function of lanterns/luminaires/lamps, control equipment, poles and associated hardware used for street lighting, such as:
  - high pressure mercury vapour, low pressure and high pressure sodium vapour, fluorescent, quartz-halogen, wood, concrete, steel, composite, choke boxes, photo-electric cells, time switches and contactor boxes
- types of lighting systems, including:
  - overhead and underground street lighting systems
  - controlling and switching of lighting systems
- techniques for the installation of street lighting systems
- techniques for the maintenance of street lighting systems, such as:
  - diagnosing of faults; removing, repairing, replacing and cleaning of public lighting and associated hardware
- application of specific testing equipment, such as:
  - voltage detectors, insulation resistance testers, clamp-on ammeters, continuity testers and fault indictors
- techniques for the inspection, testing and commissioning of street lighting 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 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 installing and maintaining power system public lighting

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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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UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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 overhead conductors and cables used on poles and structures (excluding towers) in the electricity supply industry (ESI).

It includes stringing, tensioning and terminating of conductors/cables, cleaning de-energised insulators, securing conductors to insulators or supports and undertaking electrical connections.

It also includes maintenance work associated with diagnosing faults, conducting visual inspections, confirming phasing, completing workplace tests, isolating systems and circuits, issuing/accepting electrical access permits and updating system data/maintenance records.

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

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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 for installation and maintenance of overhead conductors and cables used on poles and/or structures	**1.1** Work schedules, construction 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 the installation and maintenance of overhead conductors and cables used on poles and/or structures 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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

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		in accordance with workplace procedures
2 Carry out installation and maintenance of overhead conductors and cables used on poles and/or structures	**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	Electrical systems and circuits are checked and isolated in accordance with job requirements, work permits and workplace procedures
	2.4	Installation and maintenance of overhead conductors and cables used on poles and/or structures are completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.5	Overhead conductor/cables are strung, tensioned and terminated in accordance with workplace procedures
	2.6	Insulators are cleaned and conductors, anti-vibration devices and spaces/spreaders are secured in accordance with workplace procedures
	2.7	Electrical connections are made in accordance with job requirements and workplace procedures
	2.8	Maintenance, including repair and/or replacement of overhead conductors and cables used on poles and/or structures, is carried out in accordance with work schedule, job requirements and workplace procedures
	2.9	Unplanned events are responded to in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of overhead conductors and cables used on poles and/or structures	**3.1**	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 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 and overhead conductors and cables used on poles and/or structures are returned to service in accordance with workplace procedures

3.6 Conductors/cables are tested and commissioned in accordance with job requirements and workplace procedures

3.7 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 UETTDRIS54A Install and maintain poles, structures and overhead conductors and cables.

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 UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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
- installing and maintaining poles, structures and overhead conductors and cables using at least two (2) of the following:
  - copper
  - aluminium
  - steel
  - low voltage (LV) aerial bundled cable (ABC)
  - aluminium/steel reinforced
  - high voltage (HV) ABC
  - HV insulated unscreened conductor (IUC)
  - pilot
- using at least two (2) of the following height access methods:
  - elevated work platform (EWP)
  - portable platform
  - ladder
- using at least three (3) of the following types of stringing equipment:
  - tension equipment*
  - cable drum stands
  - cable trailers
  - ropes
  - rollers
  - sheaves
  - stockings
  - stringing equipment
  - swivels

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  - winches
  - (* must do one)
- using at least two (2) of the following types of testing and recording equipment:
  - voltage indicators *
  - phasing sticks
  - fault indicators
  - field intensity meter
  - operating rods
  - (*must do)
- using at least one (1) of the following types of stringing methods:
  - lay-out (stringing method)
  - pull through (stringing method)
  - pilot rope (stringing method)
- using at least one (1) of the following tensioning methods:
  - dynamometer
  - site board
  - beat (wave sagging)
  - abney level
  - theodolite
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
- safe work practices, including:
  - requirements to enable safe working on conductive poles
  - procedures to attach on site earthing devices to de-energised LV and HV circuits
- requirements for the use of overhead line construction manuals, system diagrams/plans and drawings, including:
  - material lists
  - conductor size, type and route length
- constructions types and structures for distribution and sub-transmission lines
- types, sizes and characterises of overhead conductors
- resources for the stringing and maintenance of conductors, including:
  - types of LV and HV overhead electrical conductor connections
  - causes and effects of poor electrical connections
  - reasons for and methods used to maintain standard phase sequencing

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  - removing, repairing and replacing damaged conductors
  - minimum clearances between overhead conductors and LV and HV structures
- techniques for conductor installation, including:
  - types and application of tools, equipment and hardware
  - methods of stringing, tensioning and termination of LV and HV 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
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry for installing and maintaining poles, structures and overhead conductors and cables
- 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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UETTDRIS55 Install and maintain low voltage underground services

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 low voltage (LV) underground services in the electricity supply industry (ESI).

It includes the installation, maintenance and connection of low voltage underground service lines and associated equipment between the connection point and the point of supply.

It also includes the repair and replacement of service cables, service fuses and the replacement and repair of service hardware and the identification and rectification of faults. It also covers insulation, voltage, phase rotation and polarity testing.

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

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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

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

Electrotechnology Electrician 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

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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

Industry Specific Cross Discipline

Elements and 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 installation and maintenance of LV underground services and associated equipment	**1.1** Work schedules, construction 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 the installation and maintenance of LV underground services and associated equipment 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 work permits are obtained, understood and signed 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 installation and maintenance of LV underground services and associated equipment	**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	Installation and maintenance of LV underground services and associated equipment are performed in agreed timeframes, to quality standards with a minimum of waste in accordance with workplace procedures
	2.4	LV underground services and associated equipment are installed in accordance with job requirements, work permits and workplace procedures
	2.5	Maintenance, including repair and/or replacement of LV services and associated equipment, is assembled in accordance with construction plans, drawings and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of LV	**3.1**	Completed work is checked against work schedule, construction plans and drawings for compliance and

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underground services and associated equipment		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, are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permits are signed off and the LV services and associated equipment are 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 UETTDRIS55A Install and maintain low voltage underground services.

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 UETTDRIS55 Install and maintain low voltage underground services

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
- connecting low voltage (LV) underground services to at least two (2) of the following:
  - underground pillar/pit connection (single phase)
  - underground pillar/pit connection (three phase*)
  - underground to overhead connection
  - (* must do)
- installing LV underground service protection devices, including at least one (1) of the following:
  - fuse units
  - circuit breakers
  - service links
- testing of LV underground service connections, including at least four (4) of the following:
  - polarity test *
  - phase rotation test
  - continuity test
  - voltage test
  - insulation resistance test
  - (* must do)
- installing LV underground service cables using at least one (1) of the following:
  - aluminium LV cable
  - cross-linked polyethylene (XLPE) cable
  - copper LV cable
- 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
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
  - types of LV underground services
  - methods of construction and installation
  - minimum depths for underground services to be buried and proximity to other assets and structures
- installation equipment/tools, including:
  - equipment and tools for underground service installation
  - fittings and hardware for underground service installation
- methods of laying cables, including:
  - conduits and sand and slabbing
- characteristics and applications of different types of cables, including:
  - cable cross-sectional area of conductors
  - current rating and fuse types and ratings
- techniques for maintenance of service installations, including:
  - diagnosis and repair of faults
- jointing and terminating methods, including:
  - polymeric heat-shrink materials
  - polymeric tape materials
  - insulated piercing connectors (IPCs)
  - energised and de-energised cables
  - connections to point of entry, fuse boxes, pillars and pits
- testing and commissioning procedures, including:
  - pre-energising tests - insulation resistance and continuity test
  - inspection
  - equipment functionality tests
  - polarity, voltage and phase sequence tests
  - neutral and phase identification tests
  - neutral integrity tests
  - meter function test
  - testing check forms
- connection principles, including:
  - purpose and function of multiple earth neutral (MEN) system
  - types of connection faults
  - causes and effects of incorrect and poor electrical connections

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- principles of loop impedance
- reasons for and methods used to maintain standard phase sequencing
- purpose and operation of service fusing
- use of independent earth for 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 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 installing and maintaining LV underground services
- 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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UETTDRIS56 Install and maintain low voltage overhead services

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 low voltage (LV) overhead services in the electricity supply industry (ESI).

It includes the installation and connection of LV overhead service cables and associated equipment, the repair and replacement of service cables, services fuses and service hardware and identifying and rectifying faults. It also includes insulation, voltage, polarity and phase rotation testing.

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

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

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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

Electrotechnology Electrician 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

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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 installation and maintenance of LV overhead services and associated equipment	**1.1** Work schedules, construction 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 the installation and maintenance of LV overhead services and associated equipment 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 identified in accordance with

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		workplace procedures
	1.6	Relevant work permits are obtained, understood and signed 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 installation and maintenance of LV overhead services and associated equipment	**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	Installation and maintenance of LV overhead services and associated equipment are performed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	LV overhead services and associated equipment are installed in accordance with work schedule, job requirements and workplace procedures
	2.5	Maintenance, including repair and/or replacement of LV overhead services and associated equipment, is assembled in accordance with construction plans, drawings and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of LV overhead services and associated equipment	**3.1**	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 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 and the LV overhead services and associated equipment are 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 UETTDRIS56A Install and maintain low voltage overhead services.

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 UETTDRIS56 Install and maintain low voltage overhead services

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
- connecting low voltage (LV) overhead service cables, including at least two (2) of the following:
  - overhead service line (three phase) *
  - overhead service line (single phase)
  - overhead service line (two phase)
  - (* must do)
- installing LV overhead service protection devices, including at least one (1) of the following:
  - service fuse
  - circuit breakers (pole)
  - service link
- conducting tests of LV overhead service connections, including all of the following:
  - polarity test *
  - phase rotation test
  - continuity test
  - voltage test
  - (* must do)
- connecting LV overhead services to at least one (1) of the following overhead distribution conductor types:
  - aluminium LV mains
  - copper LV mains
  - LV aerial bundled cable (ABC) mains
- 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
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
  - types of LV overhead services
  - methods of construction and installation
  - minimum clearances for overhead services to assets and structures
  - ground clearances for overhead services
  - maximum span lengths and tensions for overhead services
  - customer poles
- installation equipment/tools, including:
  - equipment and tools for overhead service installation
  - fittings and hardware for overhead service installation
- characteristics and applications of different types of cables, including:
  - cable cross-sectional area of conductors
  - current rating and fuse types and ratings
- stringing and terminating methods, including:
  - energised and de-energised cables
  - connections to point of attachment, fuse boxes and pole top boxes
  - termination at customer pole
- connection of overhead services, including:
  - types of overhead service connections
  - live LV work principles
- techniques for maintenance of overhead service installations, including:
  - diagnosis and repair of faults
  - removing, repairing and replacing damaged overhead services
  - removing and replacing pole type fuses
- testing and commissioning procedures, including:
  - inspection
  - equipment functionality tests
  - continuity tests
  - polarity, voltage and phase sequence tests
  - neutral and phase identification tests
  - neutral integrity tests
  - meter function test
  - testing check forms
- connection principles, including:

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- purpose and function of the multiple earth neutral (MEN) system
- types of connection faults
- causes and effects of incorrect and poor electrical connections
- principles of loop impedance
- reasons for and methods used to maintain standard phase sequencing
- purpose and operation of service fusing
- use of independent earth for 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 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 installing and maintaining LV overhead services
- 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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UETTDRIS57 Conduct visual checking and treatment of power system poles and structures

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 conduct visual checking and treatment of power system poles and structures in the electricity supply industry (ESI).

It includes testing or examining at eye level to below ground, checking above ground of crossarms and attached hardware with the use of binoculars to determine the integrity of poles, structures and attached hardware. It also includes completing inspection reports and updating workplace records.

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.

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

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

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Transmission Overhead Pathway Group

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

UETTDRTP30 Inspect transmission overhead structures and electrical apparatus

Distribution Overhead Pathway Group

UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

UETTDRDP12 Maintain overhead energised low voltage conductors and cables

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

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

UETTDRDP11 Inspect overhead poles-structures and electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

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 perform visual checking and treatment of poles and structures	**1.1** Work schedules, construction 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 the visual checking and treatment of poles and structures 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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 visual checking and treatment of poles	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to

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and structures		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	Visual checking and treatment of poles and structures to ensure completion are performed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4	Visual checking, by testing or examining pole and/or structures from eye level to below ground, is conducted in accordance with job requirements and workplace procedures
	2.5	Defective or suspect poles are identified for repair or replacement in accordance with workplace procedures
	2.6	Treatment of poles and/or structures is performed in accordance with work schedule, job requirements and workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete the visual checking and treatment of poles and structures	**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 and poles and structures are returned to service in accordance with workplace procedures

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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 UETTDRIS57A Conduct visual checking and treatment of power system poles and structures.

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 UETTDRIS57 Conduct visual checking and treatment of power system poles and structures

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 visually at least one (1) of the following types of poles:
  - wood
  - steel
  - concrete
  - composite
- testing power systems poles and structure using at least one (1) of the following:
  - stress tester
  - drill test
  - non-intrusive test
- conducting maintenance of power systems poles and structures using at least one (1) of the following:
  - chemical treatment
  - re-butting
  - nailing
  - welding
  - stays/guys
- completing all of the following:
  - recording
  - reporting
- visually checking hardware attached to poles and structures, including at least two (2) of the following:
  - cross-arms
  - insulators
  - surge arrestors

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  - support brackets
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements
- chemical treatment principles, including:
  - types of chemical used to treat timber
  - regulations and procedures in handling and transporting chemicals safely
  - application procedures of chemicals to wood
- deterioration prevention techniques, including:
  - relationship between steel, concrete and wood
  - inspection procedures for deterioration
  - deterioration prevention procedures in steel, concrete and wood
  - procedures for the repair of deterioration in steel, concrete and wood.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 conducting visual checks and treatments of power system poles and structures
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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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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UETTDRIS58 Locate faults in power system underground power cables

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 locate faults in power system underground power cables in the electricity supply industry (ESI).

It includes diagnosis and detecting the location of faults in underground power cables. It includes obtaining the required access to test or equivalent permit, setting up the fault location test equipment and following the procedure to carry out the cable fault location test plan.

It also includes interpreting test results, documenting the fault location and likely cause, and listing recommendations for correcting the cable fault to meet client requirements.

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

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

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

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UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

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 locate faults in underground power cables	**1.1** Work schedules, including cable specifications and standards, cable route data, history, characteristics, drawings, plans, requirements, 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 locating faults in underground power cables 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed in accordance with workplace procedures
	1.7 Equipment, tools and personal protective equipment required (PPE) for work are identified, obtained and confirmed in working order

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	1.8 Test equipment is assembled and checked for calibration status in accordance with workplace procedures
	1.9 Cable fault location test procedures/plans are prepared and range of tests required is determined in accordance with job requirements and workplace procedures
	1.10 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11 Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out location of faults in underground power cables	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents in accordance with workplace procedures
	2.2 Requirements for lifting, climbing, working at heights and use of power tools/equipment are followed in accordance with workplace procedures
	2.3 Locating faults in underground power cables is performed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4 Cable is tested to determine location relevant faults in accordance with job requirements and workplace procedures
	2.5 Unplanned events in the location of faults in underground power cables are responded to in accordance with workplace procedures
	2.6 Quality checks of work are undertaken in accordance with workplace procedures
3 Complete location of faults in underground power cables	**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 cleaned and made safe in accordance with workplace procedures

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3.4 Tools, equipment and surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures

3.5 Relevant work permits are signed off and cable/site 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 UETTDRIS58A Locate faults in power system underground power cables.

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 UETTDRIS58 Locate faults in power system underground power cables

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
- locating faults in power system underground power cables using at least three (3) of the following:
  - time domain reflectometry (TDR)
  - pool of potential in earth (POPIE)
  - differential TDR radar
  - current impulse
  - Murray loop
  - Varley loop
  - radio detection
  - capacitance/inductance
  - continuity tests
  - insulation tests
  - voltage detection
- 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:

- installation of underground cable, including:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal

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protective equipment (PPE), hazards for the use of liquid petroleum gas (LPG), equipment for jointing of underground cable, gas bottle testing procedures, permit to work systems and isolation procedures
    - trench excavation and reinstatement procedures
    - installation of underground cable procedures - types of tools and equipment, methods of installing conduits, methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
    - procedures for the safe use of LPG equipment for cable jointing
- location of cable faults in underground power cables, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements
    - types of faults
    - methods of locating faults - Murray loop test, Fisher connection of Murray loop, modified Fisher connection, Varley loop test, TDR, differential TDR radar, digital arc reflection, differential digital arc reflection, current impulse test, differential current impulse, decay, differential decay, POPIE, radio detection, capacitance inductance test, pending faults (thermography and cable/joint temperature measurement), cable location devices/equipment and methods (signal generator/receiver, phasing methods using ‘megger’, current injection and cable stabbing techniques), and cable identification
    - low voltage (LV) energised working practices - regulations, working methods, insulating glove, bare hand, work procedures and specialist equipment
    - safety precautions specific to working near conductors - safe working practices and procedures, working in confined spaces, permit to work systems and isolation procedures
- jointing and termination of LV polymeric cable, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of LV polymeric cables
    - types of cables - single core, multi-core and cross-linked polyethylene (XLPE) insulation
    - methods of cable handling - direct laid cables, duct laid cables, solid laid cables, cables supported in cleats or hangers, corrosion protection and minimum bending radius of cables
    - methods of cable sealing - shorting of cables cores, core of un-terminated cables, methods of protection from corrosion, polymeric sheathed cables sealing with mastic lined, and heat shrink caps buried sealed ends
    - types of jointing tools - general hand tools and compression tools
    - techniques in the use of LPG - safety precautions, PPE, and general maintenance and repair
    - safety precautions when cable jointing - working in confined spaces; permit to work systems and isolation procedures; and emergency rescue/response, including first aid
- LV polymeric cable jointing principles; including:
    - techniques in jointing LV XLPE cables - straight through joint, jointing different types of cable and service and street light cable joints
    - techniques in terminating LV XLPE - pole top terminations, substation terminations, distribution pillar/column/cubicle terminations and service and street light cable terminations
    - techniques in repairing LV XLPE cable - different types of damage, repairs to sheath and

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    - repairs to cores
    - methods of testing cable after jointing
- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of high voltage (HV) underground polymeric cables
- HV underground polymeric cables requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
    - characteristics of different types of cables and components
    - purpose of stress control
    - applications of various tools and equipment for HV jointing
- procedure for isolating HV underground polymeric cables, including:
    - method for proving safe to work
    - earthing procedures
- techniques in jointing HV underground polymeric cables, including:
    - short circuit cores and seal cable
    - straight through
    - trifurcating
- techniques in HV underground polymeric cable terminations, including:
    - pole top termination
    - substation/switchgear termination
    - aerial bundled cable (ABC) termination
    - telcon termination
- procedures for repairing HV underground polymeric cables, including:
    - location of faults
    - types of damage
    - techniques to repairs to sheath
    - techniques to repairs to core
- jointing LV paper lead/lead type cables, including:
    - requirements for the use of enterprise manuals, system diagrams/plans and drawings
    - types of tools and equipment
    - types of LV cables
    - structure of LV PLY cables
    - techniques for lead wiping
    - technique for preparing and jointing LV lead sheathed paper insulated cables
    - installation methods of LV straight joint
    - inspection and repair procedures to outer sheath of lead sheathed LV cable
    - techniques in terminating LV lead sheathed paper insulated cables
    - methods of testing cable after jointing
- HV paper lead cable jointing principles, including:
    - requirements for the use of enterprise manuals, system diagrams/plans and drawings
    - types of tools and equipment

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  - types of HV cables
  - structure of HV cables
  - technique for the installation of transition joint between XLPE and lead sheathed paper insulated cables
  - technique for the jointing, terminating and repairing of HV paper lead insulated cables
  - methods of testing cable after jointing
- underground cables construction and types, including:
  - safety precautions specific to handling underground cables
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - types and applications of underground cables
  - construction types and structures of underground cables
  - characteristics of different types of underground cables
  - ratings
- aluminium and lead cable sheathed jointing procedures, including:
  - safety precautions specific to handling and jointing underground aluminium and lead cable, including provision of WHS/OHS information, such as material safety data sheets (MSDS)
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - construction and structure(s) of aluminium and lead cable underground cables
  - characteristics of aluminium and lead cable
  - ratings
  - techniques in the jointing of aluminium and lead sheathed cable
  - methods of testing cable after jointing.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 locating faults in power system underground power cables
- applicable documentation, including workplace procedures, relevant industry standards,

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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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UETTDRIS59 Conduct high potential testing of power system underground power cables

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 conduct high potential testing of power system underground power cables in the electricity supply industry (ESI).

It includes obtaining the required access to test or equivalent permit, setting up the fault location test equipment and following the procedure to carry out the cable test plan. It also includes interpreting test results, documenting the actual testing, and listing recommendations to meet client requirements.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS41 Install network infrastructure electrical equipment

UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS55 Install and maintain low voltage underground services

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 Plan to conduct high potential testing	**1.1** Work schedules, construction 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 high potential testing 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed in accordance with workplace procedures
	1.7 Equipment, tools and personal protective equipment

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		(PPE) required for work are identified, obtained and confirmed in working order
	1.8	Clients/customers are provided with alternative options within scope, acceptable cost and job requirements
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.10	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Perform high potential testing	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents in accordance with workplace procedures
	2.2	First aid, pole top rescue and other related work procedures are performed in accordance with job requirements and workplace procedures
	2.3	Requirements for lifting, climbing, working at heights and use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Remedial actions are taken to overcome shortfalls in work schedule in accordance with job requirements and workplace procedures
	2.5	High potential testing is performed in accordance with work schedules, job requirements and workplace procedures
	2.6	High potential testing is performed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Solutions used to solve problems are applied in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete high potential testing	**3.1**	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 made 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 Relevant work permits are signed off and underground cables are 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 UETTDRIS59A Conduct high potential testing of power system underground power cables.

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 UETTDRIS59 Conduct high potential testing of power system underground power cables

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
- testing to be conducted on:
  - high voltage (HV) distribution cable
  - HV transmission cable
- using at least one (1) of the following:
  - HV polymeric
  - HV paper insulated
  - oil filled
  - gas filled
- using at least four (4) of the following:
  - phasing instruments*
  - direct current (d.c.) high potential tester*
  - voltage detectors
  - insulation testers*
  - continuity testers
  - cable identification instrument
  - (*must do)
- 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:

- installation of underground cable, including:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and

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drawings
    - safety precautions specific to the installation of underground cable - excavation and trench safety regulations, gas detection procedures, working in confined spaces, personal protective equipment (PPE), hazards for the use of liquid petroleum gas (LPG), equipment for jointing of underground cables, gas bottle testing procedures, permit to work systems and isolation procedures
    - trench excavation and reinstatement procedures
    - installation of underground cable procedures - types of tools and equipment, methods of installing conduits, and methods of installing cables and sealing cable ends (direct buried, ducts cleated and racked)
    - procedures for the safe use of LPG equipment for cable jointing
- location of cable faults in underground power cables, including:
    - standards, codes, legislation, supply authority regulations and or enterprise requirements
    - types of faults
    - methods of locating faults - Murray loop test, Fisher connection of Murray loop, modified Fisher connection, Varley loop test, time domain reflectometer (TDR), differential TDR radar, digital arc reflection, differential digital arc reflection, current impulse test, differential current impulse, decay, differential decay, pool of potential in earth (POPIE), radio detection, capacitance inductance test, pending faults (thermography and cable/joint temperature measurement); cable location devices/equipment and methods (signal generator/receiver, phasing methods using ‘megger’, current injection, cable stabbing techniques); and cable identification
    - low voltage (LV) energised working practices: - regulations, working methods, insulating glove, bare hand, work procedures and specialist equipment
    - safety precautions specific to working near conductors - safe working practices and procedures, working in confined spaces, permit to work systems and isolation procedures
- jointing and termination of LV polymeric cable, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of LV polymeric cables
    - types of cables - single core, multi-core and cross-linked polyethylene (XLPE) insulation
    - methods of cable handling - direct laid cables, duct laid cables, solid laid cables, cables supported in cleats or hangers, corrosion protection and minimum bending radius of cables
    - methods of cable sealing - shorting of cables cores, core of un-terminated cables, methods of protection from corrosion, polymeric sheathed cables sealing with mastic lined, and heat shrink caps buried sealed ends
    - types of jointing tools - general hand tools and compression tools
    - techniques in the use of LPG - safety precautions, PPE, general maintenance and repair
    - safety precautions when cable jointing - working in confined spaces; permit to work systems and isolation procedures; and emergency rescue/response, including first aid
- LV polymeric cable jointing principles, including:
    - techniques in jointing LV XLPE cables - straight through joint, jointing different types of cable and service and street light cable joints
    - techniques in terminating LV XLPE - pole top terminations, substation terminations,

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distribution pillar /column/cubicle terminations, and service and street light cable terminations
    - techniques in repairing LV XLPE cables - different types of damage, repairs to sheath and repairs to cores
    - methods of testing cable after jointing
- standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the jointing of HV underground polymeric cables
- HV underground polymeric cables requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
    - characteristics of different types of cables and components
    - purpose of stress control
    - applications of various tools and equipment for HV jointing
- procedure for isolating HV underground polymeric cables, including:
    - method for proving safe to work
    - earthing procedures
- techniques in jointing HV underground polymeric cable, including:
    - short circuit cores and seal cable
    - straight through
    - trifurcating
- techniques in HV underground polymeric cable terminations, including:
    - pole top termination
    - substation/switchgear termination
    - aerial bundled cable (ABC) termination
    - telcon termination
- procedures for repairing HV underground polymeric cables, including:
    - location of faults
    - types of damage
    - techniques to repairs to sheath
    - techniques to repairs to core
- jointing LV paper lead/lead type cables, including:
    - requirements for the use of enterprise manuals, system diagrams/plans and drawings
    - types of tools and equipment
    - types of LV cables
    - structure of LV PLY cables
    - techniques for lead wiping
    - technique for preparing and jointing LV lead sheathed paper insulated cables
    - installation methods of LV straight joint
    - inspection and repair procedures to outer sheath of lead sheathed LV cable
    - techniques in terminating LV lead sheathed paper insulated cables
    - methods of testing cable after jointing

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- HV paper lead cable jointing principles, including:
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - types of tools and equipment
  - types of HV cables
  - structure of HV cables
  - technique for the installation of transition joint between XLPE and lead sheathed paper insulated cables
  - technique for the jointing, terminating and repairing of HV paper lead insulated cables
  - methods of testing cable after jointing
- underground cables construction and types, including:
  - safety precautions specific to handling underground cables
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - types and applications of underground cables
  - construction types and structures of underground cables
  - characteristics of different types of underground cables
  - ratings
- aluminium and lead cable sheathed jointing procedures, including:
  - safety precautions specific to handling and jointing underground aluminium and lead cable, including provision of WHS/OHS information, such as material safety data sheets (MSDS)
  - requirements for the use of enterprise manuals, system diagrams/plans and drawings
  - construction and structure(s) of aluminium and lead cable underground cables
  - characteristics of aluminium and lead cable
  - ratings
  - techniques in the jointing of aluminium and lead sheathed cable
  - methods of testing cable after jointing
- 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 backfeed
  - LV switching techniques - identifying hazards, assessing and controlling risks associated with LV switching operations, electrical access permit(s), operational procedures and earthing procedures
  - PPE for LV switching.

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 PPE currently used in industry for conducting high potential testing of power system underground power cables
- 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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UETTDRIS60 Install and replace power system energy meters and associated 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 install and replace power system energy meters and associated equipment in the electricity supply industry (ESI).

It includes the installation and replacement of whole current energy meters and associated equipment, the identification of faults and returning to service. It also covers normal functions of the meters and associated equipment in accordance with workplace procedures.

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

Distribution Overhead Pathway Group

UETTDRDP12 Maintain overhead energised low voltage conductors and cables

UETTDREL11 Apply sustainable energy and environmental procedures

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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

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

Electrotechnology Electrician 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

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

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

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 for installation and replacement of energy meters and associated equipment	**1.1** Work schedules, construction 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 the installation and replacement of energy meters and associated equipment 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 identified in accordance with workplace procedures
	1.6 Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.7 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.8 Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out the installation and replacement of energy meters and associated	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents in accordance with workplace

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equipment		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	Installation and replacement of energy meters and associated equipment are performed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Installation and/or replacement of energy meters and associated equipment is performed, including required wiring, testing, programming and sealing of meters and associated equipment, in accordance with job requirements and workplace procedures
	2.5	Unplanned events are responded to in accordance with workplace procedures
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete the installation and replacement of energy meters and associated equipment	**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	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.

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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 UETTDRIS60A Install and replace power system energy meters and associated 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 UETTDRIS60 Install and replace power system energy meters and associated 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
- installing whole current energy meters on at least (1) one of the following types of meters:
  - induction disk energy meter
  - electronic energy meters
  - maximum demand meters
  - electronic summators
- installing associated metering equipment, including at least one (1) of the following:
  - service fuses
  - service links
  - meter boards
  - meter panels
- installing associated metering equipment, including at least one (1) of the following:
  - time switches
  - frequency injection relays
  - controlled output meters
  - contactors
- 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:

- cable protection and support methods and accessories, including:
  - requirements to protect and support cables adequately - protection against mechanical damage, protection from adverse temperatures and corrosion, and protection from

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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, cable drawing and hauling techniques
- types of cables used in electrotechnology 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 varieties - 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
- 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 of penetration structural elements and maintenance of fire protection interiority
    - cable segregation requirements
- basic cable and conductor terminations, including:
    - insulation removal and replacement
    - conductor handling and cable terminations - general aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes, application of connecting devices for conductors and terminals, continuity through connections and insulation resistance testing, and stress release on cables/conductors
- power cable and conductor terminations, including:
    - types of cable glands and their application - glands for circular sheathed cables, steel wire armoured (SWA) cables and mineral-insulated metal-sheathed (MIMS) cables
    - cable termination techniques
    - terminal types and applications
    - conductor termination techniques - need for sound termination, consequences of poor conductor termination, conductor and terminal preparation
- telecommunication 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
    - end-to-end testing
    - methods of terminating cables - cables less than twenty pair, twenty pair cable and greater
    - cable labelling devices
    - colour coding of cables, sockets and termination modules and standard connectors used with twisted pair, optical fibre and coaxial cables
- terminating cable and conductor used in electronic equipment, including:

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  - cable and conductor types and characteristics - insulated wire, harness wiring, high performance cables (transmission performance parameters and electrical characteristics), such as:
    - unshielded twisted pair (UTP), foil twisted pair (FTP) and shielded twisted pair (STP)
  - coaxial cables types and characteristics - qualshield, trishield coaxial and armour plated coaxial cables
  - cable anchoring and support methods
  - termination methods
- installation of metering and control equipment, including:
  - standards, codes, legislation, supply authority regulations and or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
  - types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering systems summators
  - installation and removal methods - direct connection and plug in method, enterprise specific
  - types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch, audio frequency injection relay
  - testing procedures - safety testing, polarity testing
- 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 procedures 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, 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; and ; 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

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with network operations and equipment; and requirements for effective communications operations for aerial 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 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 installing and replacing power system energy meters and associated equipment
- 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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UETTDRIS61 Install mobile generation set for synchronised LV Genset

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 mobile generation set for synchronised low voltage (LV) Genset in the electricity supply industry (ESI).

It includes installing temporary portable generation sets to LV distribution assets to maintain supply. It also includes operating, connecting and disconnecting generators and estimating LV load and selecting the appropriate generator for required outcome.

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
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
Electrotechnology Electrician 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

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

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

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 Plan to install mobile generation set for synchronised LV Genset	**1.1** Work schedules, construction 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), policies and procedures related to the work are used and actioned to ensure safe systems of work are followed.

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	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 identified in accordance with workplace procedures
	1.6	Relevant work permits are obtained, understood and signed 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	Clients/customers are provided with alternative options within scope, acceptable cost and job requirements
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.10	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out the installation of mobile generation set for synchronised LV Genset	**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	First aid and other related work procedures are performed in accordance with job requirements and/or 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	Remedial actions are taken to overcome shortfalls in work schedule in accordance with job requirements and workplace procedures
	2.5	The installation of mobile generation set for synchronised LV genset is carried out in accordance with the work schedule, job requirements and workplace procedures
	2.6	Installation of mobile generation set for synchronised

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		LV Genset is completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.7	Solutions used to solve problems are identified and actioned in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation of mobile generation set for synchronised LV Genset	**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 and synchronised LV Genset apparatus 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 UETTDRIS61A Install mobile generation set for

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synchronised LV Genset.

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 UETTDRIS61 Install mobile generation set for synchronised LV Genset

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
- operating a generator
- connecting a generator
- disconnecting a generator
- completing all of the following:
  - the synchronising of generator control systems onto the network without interruption to supply
  - the synchronising of generator control systems off the network without interruption to supply
- estimating low voltage (LV) load of the generator
- assessing the appropriateness of the generator
- operating a generator in parallel to a single LV job
- 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:

- safety precautions specific to installing mobile generators, including:
  - safe working practices and procedures
  - techniques in connecting, operating and disconnecting generators
  - types of tools and equipment
  - safe use of tools and equipment
- techniques in the installation of Gensets, including:
  - the synchronising of generator control systems onto and off the network without

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interruption to supply
    - estimation of LV load
    - assessing the appropriateness of the generator
- operating a generator in parallel to a single LV job, including:
    - overhead systems
    - indoor systems
    - customer installations
    - kiosk substations
    - LV genset and control system to LV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 installing mobile generation sets for synchronised LV Genset
- 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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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

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 implement and monitor the power system organisational work health and safety (WHS)/occupational health and safety (OHS) policies, procedures and programs in the electricity supply industry (ESI).

It includes participative arrangements for management of organisational WHS/OHS policies procedures, programs and issues. It also includes disseminating information on hazards and risk assessments to meet WHS/OHS standards; collating work group input; and, implementing workplace procedures for resolving WHS/OHS issues.

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

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

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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 implement and monitor organisational WHS/OHS policies, procedures and programs	**1.1** Relevant workplace documentation is identified, analysed and work preparation required for planning and coordination determined
	1.2 Relevant requirements and workplace procedures are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures are prioritised, implemented and monitored to ensure work safe systems are followed in accordance with workplace procedures
	1.4 Work is prioritised and sequenced for efficient and effective outcome following consultation with relevant personnel for completion within agreed timeframes, to standard and in accordance with workplace procedures
	1.5 Risk control measures are identified, prioritised, implemented and evaluated in accordance with work schedule
	1.6 Relevant work permits are confirmed and signed in accordance with requirements and/or workplace procedures
	1.7 Resources, personnel, equipment, tools and personal protective equipment (PPE) required for the job are identified, scheduled, coordinated and confirmed in safe and technical working order
	1.8 Potential issues in communicating with relevant person/s, authorities, clients and land owners are identified, resolved and work activities planned and coordinated
	1.9 Worksite is prepared in accordance with the work schedule to minimise WHS/OHS risk, damage to property, commerce and individuals in accordance with workplace procedures

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	1.10 Personnel and contractors participating in work are fully briefed and responsibilities authorised and coordinated in accordance with workplace procedures
	1.11 Traffic management plan is confirmed as being applied in accordance with workplace procedure
2 Carry out the implementation and monitoring of organisational WHS/OHS policies, procedures and programs	**2.1** WHS/OHS and sustainable energy principles and practices are implemented and monitored to reduce workplace incidents and minimise waste in accordance with job requirements and workplace procedures
	2.2 Relevant worksite personnel are confirmed current in first aid and rescue-related work in accordance with job requirements and workplace procedures
	2.3 Lifting, climbing, working in confined spaces, working at heights, using power tools and equipment techniques and practices are followed safely in accordance with requirements and workplace procedures
	2.4 Hazard warnings and safety signs are recognised, hazards assessed, WHS/OHS risk control measures implemented and monitored and/or appropriate authorities consulted, as required, in accordance with requirements and workplace procedures
	2.5 Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures
	2.6 Participative arrangements for the systematic management of WHS/OHS policies, procedures, programs and issues are implemented and monitored in accordance with work schedule, job requirements and workplace procedures
	2.7 Participative arrangements for the systematic management of WHS/OHS policies, procedures, programs and issues are implemented and monitored to ensure completion in agreed timeframe, to quality standards with a minimum of waste in accordance with job requirements
	2.8 Solutions to non-routine problems are identified and applied in accordance with requirements

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	2.9	Quality of work checks are undertaken in accordance with job requirements and workplace procedures and to a community/industry standard
3 Complete implementation and monitoring of organisational WHS/OHS policies, procedures and programs	**3.1**	Work is checked against work schedule for conformance with job requirements, anomalies reported and solutions identified in accordance with workplace procedures
	3.2	Accidents, incidents and/or injuries are reported in accordance with requirements and workplace procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures
	3.4	Tools, equipment and surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures
	3.5	Relevant work permit/s are signed off, work completed/returned to service and client/customer advised in accordance with job requirements
	3.6	Work completion records, reports and information are confirmed, processed 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS62A Implement and monitor the power system organisational OHS policies, procedures and programs.

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Links

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Assessment Requirements for UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

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
- implementing and monitoring the power system organisational WHS/OHS policies, procedures and programs using all of the following:
  - relevant WHS/OHS Acts
  - regulations
  - codes of practice
- demonstrating all of the following:
  - application of organisation management systems and procedures to WHS/OHS
  - organisation’s procedures for maintaining WHS/OHS records
- performing all of the following applications of risk management procedures:
  - undertake hazard identification
  - risk assessment and risk control in accordance with the hierarchy of control
  - application of the characteristics of the workforce impacting on the management of WHS/OHS
- demonstrating all of the following implementation and monitoring procedures:
  - provision of relevant information to the workgroup about WHS/OHS and the organisation's WHS/OHS policies, procedures and programs
  - participative arrangements for the management of WHS/OHS
  - organisation's procedures for identifying hazards and assessing risks
  - organisation's procedures for controlling risks
  - organisation's procedures for dealing with hazardous events
  - organisation’s procedure for providing WHS/OHS training
- 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:

- safe working practices and procedures for the installation of overhead distribution conductors, including:
  - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
  - requirements of persons prior to making bare hand contact with dead low voltage (LV) mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and high voltage (HV) apparatus
  - safe working practices - requirements to enable safe working on conductive poles, procedure to attach an on-site earthing device to de-energised LV and HV overhead circuit
- 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 procedures 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, 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; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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
- implementation and monitoring requirements for powerline safety, including:
  - identification of relevant legislation, codes and government guidelines for the

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implementation and monitoring of WHS/OHS in the workplace - Commonwealth/state/territory legislation relevant to the workplace and the meaning of general duty of care under WHS/OHS legislation and common law

- workplace WHS/OHS enterprise plan - responsibilities of each member of the work team, review process for changing/improving WHS/OHS safety plan, and standing instructions for the systematic management of WHS/OHS in the workplace
- relationship between the WHS/OHS committee and employees - methods used to collate and distribute/disseminate WHS/OHS information; staff development activities and legislation requirements with regards to WHS/OHS training; methods of addressing barriers, such as literacy and cultural differences; and provisions relating to WHS/OHS issue resolution
- hazards associated with powerline industry - identification of hazards in the workplace, processes used and contributing factors to a hazardous situation, assessment of risks and control of WHS/OHS risks (risk management), the hierarchy of control and monitoring of risk control measures
- risk assessment and its management in powerline industry - principles and purposes of risk management; processes for conducting risk assessment, including, risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
- maintenance strategies for WHS/OHS programs - developing processes for promoting, maintaining and improving WHS/OHS in the workplace; identifying techniques for evaluating and reviewing WHS/OHS education and training programs; elements of an effective WHS/OHS management system; and WHS/OHS consultation and accident/incident investigations

- 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, complaint and issues procedures
  - overview of enterprise professional development - fire-fighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprises-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 personal protection equipment (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

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  - 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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
- 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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UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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 implement and monitor the power system environmental and sustainable energy management policies and procedures in the electricity supply industry (ESI).

It includes collecting, interpreting and applying environmental management information, identifying environmental impacts, assessing risks and establishing best practice procedures for implementation of management plans to ensure compliance. It also includes monitoring policies and plans and developing modifications as part of the review process.

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 one (1) of the identified Pathway Unit Group(s) must have been completed.

Electrotechnology Pathway Unit Group

UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Electricity supply industry (ESI) - time-domain reflectometer (TDR) Pathway Unit Group

UETTDREL11 Apply sustainable energy and environmental procedures

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

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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 implement and monitor environmental and sustainable energy management policies and procedures	**1.1** Work schedules, plans, drawings, workplace procedures and material lists are received and confirmed
	1.2 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.3 Job requirements and workplace procedures are identified and communicated with relevant personnel
	1.4 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored in accordance with workplace procedures
	1.5 Relevant work permits are obtained, understood and signed onto in accordance with workplace procedures
	1.6 Plant, equipment, tools and personal protective equipment required for work is identified, obtained and confirmed in working order
	1.7 Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to perform 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
	1.10 Traffic management is planned and implemented in accordance with workplace procedures
2 Carry out the implementation and monitoring of	**2.1** WHS/OHS, sustainable energy and environmental principles and practices are monitored and actioned to reduce incidents of accidents in accordance with

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	environmental and sustainable energy management policies and procedures	workplace procedures
		2.2 First Aid, pole top rescue and other related work procedures are performed in accordance with job requirements and/or workplace procedures
		2.3 Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
		2.4 Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks and risk control measures are implemented, preventative action taken and monitored and/or appropriate authorities consulted, where necessary, in accordance with requirements and workplace procedures
		2.5 Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures
		2.6 Environmental and sustainable energy management policies and procedures are implemented and monitored in accordance with work schedules, job requirements and workplace procedures
		2.7 Environmental and sustainable energy management policies and procedures are implemented and monitored to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
		2.8 Solutions to non-routine problems are identified and actioned in accordance with workplace procedures
		2.9 Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3	**Complete the implementation and monitoring of environmental and sustainable energy management policies and procedures**	**3.1** Work is checked against work schedule for conformance with job requirements, anomalies reported and solutions identified in accordance with workplace procedures

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3.2 Accidents, incidents and/or injuries are reported in accordance with requirements and workplace procedures

3.3 Worksite is rehabilitated, cleaned up and confirmed safe in accordance with workplace procedures

3.4 Tools, equipment and surplus resources and materials are cleaned, checked and returned to storage in accordance with workplace procedures

3.5 Relevant work permit/s are signed off, work completed/returned to service and client/customer advised in accordance with job requirements

3.6 Work completion records, reports and information are confirmed, processed 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS63A Implement and monitor the power system environmental and sustainable energy management policies and procedures.

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 UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

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
- gathering environmental management information
- implementing and monitoring environmental and sustainable energy policies and plans
- identifying environmental impacts and assess risks
- implementing and monitoring the procedures for quantifying environmental impacts and controlling risks
- implementing and monitoring procedures for dealing with environmental incidents
- maintaining environmental records, reports and plans
- 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:

- environmental fundamentals, including:
  - environmental standards, codes, environmental legislation, supply authority regulations and/or enterprise requirements applicable to the control of environment associated with the worksite - relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations, and relevant community planning and development agreements (include land care agreements)
  - employer and employee responsibilities
  - methods of obtaining information on environmental issues and updates
  - methods of identifying environmental impacts from work-related activities
  - meaning of environmental terms - identification, assessment and control of risks,

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compliance, best practice and sustainable energy
    - procedures for implementing management plans to ensure compliance
- implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment, including:
    - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/state/territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
    - identification, assessment, control and monitoring of the hazards to the environment associated with the powerline industry
    - workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment; impact of the enterprise activities on air, water quality and nature; impact and level of emissions from power plant, power distribution and transmission equipment; and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage and insulation breakdown products)
    - provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
    - gathering of environment management information
    - maintenance of environmental records
    - risk assessment and its management in powerline industry
    - maintenance strategies for environment protection programs - developing processes for promoting, maintaining and improving environmental impact in the workplace; identifying techniques for evaluating and reviewing environment protection education and training programs; elements of an effective environment protection management system; and Environment Protection Authority (EPA) consultation and accident/incident investigations
- implementation and monitoring requirements for the management of sustainable energy in powerline installations and operation of plant and equipment, including:
    - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of sustainable energy principles in the workplace, and power distribution and transmission networks - Commonwealth/state/territory legislation, legislation relevant to the workplace, Environment Protection Act legislation, local government by-laws, community planning and development agreements (i.e. land care agreements)
    - monitoring and reporting procedures for enterprise-specific policy implementation on sustainable energy issues, including the gathering of energy consumption and loss information
    - ongoing development of energy conservation policies - procedures for quantifying energy usage and wastage, energy usage auditing procedures, planning of energy conservation methods, and monitoring and review processes
    - resource availability planning for policy implementation
    - techniques in managing documentation - information on applicable sustainable energy

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laws or other requirements; complaint records; training records; process information; process operational log books; inspection, maintenance and calibration records; relevant contractor and supplier information; incident reports; and information on emergency preparedness and response

- 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 personal protection equipment (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 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 policies and procedures in maintaining the operation of plant, equipment and powerline installations using sustainable energy principles, including:
  - overview of sustainable energy technologies – solar, wind, biomass and CO2 generation
  - economic benefits of sustainable energy initiatives

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- relationship between greenhouse effect and sustainable energy
- types of renewable energy technology suitable for use in Australia - photovoltaic, solar thermal, wind energy conversion, biomass, wind/tidal and gas thermal
- relationship between safe building design and energy efficiency - building aspect, insulation, ventilation, glazing, passive solar design and shading
- techniques in selecting control devices
- components within a lighting system
- energy efficient lighting products, design and installation
- use of natural light
- automated lighting control systems
- assessment of requirements and selection of system
- techniques in selecting control devices
- components within a heating, ventilation and air conditioning (HVAC) and refrigeration control system
- energy efficient refrigerants
- detection systems to control air flow
- energy star ratings for coefficient of performance
- energy control systems
- advantages of evaporative air conditioners in dry climates
- assessment of requirements and selection of 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 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, 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

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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UETTDRIS64 Install mobile generation set for synchronised HV Genset

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 installation of temporary portable generation sets to high voltage (HV) distribution assets thereby maintaining supply in accordance with industry regulations and established procedures. It encompasses the operation, connection and disconnection of a temporary portable generator and includes the estimation of HV load and assessing the appropriateness of the generator for the required outcome and networking of generators.

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

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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UETTDRIS44 Perform HV field switching operation to a given schedule
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
UETTDRIS43 Perform low voltage field switching operation to a given schedule
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
UETTDRRT30 Perform to a given schedule rail traction switching operations
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

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UETTDRIS42 Maintain network infrastructure electrical equipment

UETTDRIS43 Perform low voltage field switching operation to a given schedule

UETTDRIS55 Install and maintain low voltage underground services

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

UETTDRSB39 Perform power system substation switching operation to a given schedule

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/plan to install mobile generation set for synchronised HV genset	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with

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others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures

1.4 Relevant requirements and established procedures for the work are to all personnel and identified for all worksites

1.5 WHS/OHS policies and procedures related to the work are identified to ensure safe systems of work are followed

1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work

1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures

1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.12 Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements

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2	**Carry out the installation of mobile generation set for synchronised HV genset**	**2.1** WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
		2.2 First aid and other related work procedures are performed according to requirements and/or established procedures
		2.3 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
		2.4 Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
		2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
		2.6 Installation of mobile generation set for synchronised HV genset is carried out in accordance with the work schedule and requirements and/or established procedures
		2.7 Essential knowledge and associated skills are applied in the safe installation of mobile generation set for synchronised HV genset to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
		2.8 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
		2.9 Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3	**Complete the installation of mobile generation set for synchronised HV genset**	**3.1** Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures

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3.2 Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures

3.3 Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and synchronised HV genset apparatus is returned to service and client/customer advised in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRIS64A Install mobile generation set for synchronised HV Genset.

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 UETTDRIS64 Install mobile generation set for synchronised HV Genset

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
- completing all of the following:
  - autonomous installation of a mobile generator set for synchronised high voltage (HV) genset incorporating operation, connection and disconnection of the generator
  - evaluating load characteristics associated with networking of generators
  - synchronisation of the generator control systems onto and off the network without interruption to supply
  - estimation of HV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single HV job
- 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:

- installation of a HV mobile generation encompassing:
  - safety precautions specific to installing mobile generators - safe working policies, practices and procedures; techniques in connecting, operating and disconnecting generators; types of tools and equipment; and safe use of tools and equipment
  - techniques in the installation of generator sets - the connection of generator onto and off the network without interruption to supply and estimation of HV load
  - assessing the appropriateness of the generator
- HV generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working

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policies, practices and procedures; and synchronising procedures
    - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of HV load and assessing the appropriateness of the generator
    - operating a generator in parallel to a single HV job - overhead systems, indoor systems, customer installations and kiosk substations
    - HV generator set and control system to HV distribution assets
- powerline safety practices encompassing:
    - 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 procedures 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 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, and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 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, 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

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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UETTDRIS65 Contribute to coordinated HV live working

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 specifies the outcomes required of live line working team members to work effectively as a cohesive team to ensure safety of all team members and the community when undertaking high voltage (HV) live line work. It includes the pre-work briefing on tasks to be undertaken, roles of individual team members, identification of possible hazards, risk management analysis and implementation of palliative measures to control or mitigate the risk to acceptable levels. It also encompasses the monitoring of work performance to ensure safety, and the post-work debriefing to identify areas for continuous improvement.

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

There are no prerequisite competencies to this unit.

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.

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1 Plan to contribute to a coordinated HV live line work team

1.1 Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination by the team

1.2 Relevant requirements and established procedures for the work are communicated to all team members and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the working on HV live lines are obtained and confirmed for the purposes of the work to be performed and discussed among all team members

1.4 Work is prioritised and sequenced following consultation with all team members to ensure safe systems of work are followed for completion within acceptable timeframes and in accordance with established procedures

1.5 WHS/OHS and live line work hazards are identified, risk assessments conducted and control measures identified, prioritised, implemented and documented against the work schedule, including the checking of site weather and environmental conditions, to ensure that live line work can be undertaken safely

1.6 Relevant live line work permits or authority for live line work are secured to coordinate the performance of work by the team according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry

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		out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	All team members to be engaged in the work discuss and agree, without ambiguity, on their respective roles, and possible role changes during the course of work
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the contribution to coordinated HV live line work	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures, in particular, established live line working procedures are strictly adhered to
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices, where applicable, are safely exercised according to requirements
	2.4	Live line permits and other provisions for live line work are in place, as required, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied in the safe contribution to coordinated HV live line work to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Work is undertaken on HV live line in a team environment work according to the work schedule and requirements/established procedures
	2.7	Work is shared among all team members in a coordinated manner as discussed and agreed during pre-work briefing
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks discussed with

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		team members and reported to immediate authorised personnel for directions according to established procedures
	2.9	Unplanned events in the maintenance of HV live line work are discussed among all team members and appropriate actions undertaken accordingly
	2.10	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.11	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the contribution to coordinated HV live line work	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and HV live line work is returned to service and client/customer advised in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate personnel notified
	3.7	Aspects of work schedule are discussed/identified via feedback with fellow team members and information on improvement forwarded to appropriate personnel according to 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRIS65A Contribute to coordinated HV live working.

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 UETTDRIS65 Contribute to coordinated HV live working

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
- facilitating communication/consultation processes in a high voltage (HV) live line work team environment
- contributing to pre-work briefings and securing of live line permits or authority to work in a HV live line work team environment
- implementing WHS/OHS policies and procedures in a HV live line work team environment
- contributing to the work schedule in a HV live line work team environment
- contributing to feedback consultation on improving safe working in a HV live line work team environment
- 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:

- electrical safe working practices encompassing:
  - risk management and assessment of risk - principle and purpose of risk management and 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, and parts of an electrical system and equipment where high currents are likely
  - risks and control measures associated with HV - parts of an electrical system and equipment that operate at HV, the 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
  - optical fibre safety - coherent optical sources and joining procedures, and laser safety

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class 3a devices or their replacement
    - risks and control measures associated with LV - risks associated with modifying electrical installations; fault finding, maintenance and repair; control measures before, during and after working on electrical installations, circuits or equipment; isolation and tagging-off procedures; risks and restrictions in live work, and control measures for live work
    - risks and control measures associated with harmful dusts and airborne contaminants - thermal insulation, fibrous cement materials, and asbestos and other fibre reinforced switchboard materials
    - safety, selection, use, maintenance and care of test equipment - safety characteristics of electrical testing devices, safe use of electrical testing device, and checks and storage methods for maintaining the safety of testing devices
- powerline safety practices encompassing:
    - 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 procedures 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, the procedure 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, and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing

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rules

- working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker encompassing:
  - standards, guidelines/codes of practice, state/territory/local government legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to working safely up to the defined "safe working zone" near energised electrical apparatus, including electrical powerlines, for non-electrical worker
  - definitions of terminologies - ‘safe working zone’ ‘risk assessment’, ‘safe approach distances zones’, ‘safe working distances’.’ work permits’, access authorisation permits’, ‘technical standards’ ‘isolation procedures’ and 'compliance requirements’
  - WHS/OHS policies and procedures for working safely - emergency response and first aid procedures, such as CPR; roles and responsibilities of employers, employees and other parties under WHS/OHS legislation; personal protective equipment (PPE); identifying hazards; assessing and controlling WHS/OHS risks; first aid procedures; duties of a safety observer; working at heights/confined spaces; permit to work systems and isolation procedures
  - safe application of different types of tools and equipment
  - operation of mobile plant and machinery, such as elevated work platform (EWP) near live electrical apparatus
  - electricity supply infrastructure assets and voltages
  - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker - work functions, such as vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker
- enterprise-specific policies and procedure instructions encompassing:
  - 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 encompassing:
  - 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;

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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 specialised tools encompassing:
    - 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, assessing and controlling risks associated with their use
    - techniques for the safe use of specialised power tools
- enterprise-specific HV live line teamwork encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV live lines
    - safety precautions working on energised live lines when working in teams - live line minimum approach distances for person and plant; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; live line access authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices and checking integrity of insulation prior to work commencement
    - types and functions of specialised live line working equipment and tools and inspection techniques prior to use
    - safe working policies, procedures and practices when using and operating specialised equipment and tools
    - methods of using specialised equipment and tools
    - use of safety observers
    - emergency response and rescue, including first aid
    - relationship and responsibilities of each team member - roles of individuals in the team, contribution to joint outcome, goals/plans and objectives of the team
    - work team communication - techniques in effective communication, techniques in effective teamwork and dangers of ineffective teamwork.

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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, 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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UETTDRIS66 Manage an electricity power system WHS/OHS management system

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

The unit covers establishing, maintaining and managing systematic approaches to managing work health and safety (WHS)/occupational health and safety (OHS)in the electricity supply industry. It requires application in a management context in terms of responsibility to ensure that the workplace is, as far as practicable, safe and without risk to employees, clients and other present visitors.

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

There are no prerequisite competencies to this unit.

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 Plan to manage an ESI	**1.1** Purpose of the WHS/OHS management system is

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WHS/OHS management system		established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.2	Legislative requirements and established procedures on policies and specifications for the WHS/OHS management system are obtained or established with appropriate personnel
	1.3	Procedures and processes for identifying hazards, assessing and controlling risks, as well as dealing with hazardous events are established
	1.4	Work roles and tasks are allocated according to requirements and individuals' competencies
	1.5	Work is prioritised and sequenced for the most efficient outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.6	Appropriate participative processes with employees and their representatives are established and maintained in accordance with relevant industry standards consistent with enterprise procedures
	1.7	Issues raised through participation and consultation are dealt with and resolved promptly and effectively in accordance with procedures for issues resolution
	1.8	Information is provided to employees about the outcome of participation and consultation in a manner accessible to employees
2 Manage an ESI WHS/OHS management system	**2.1**	WHS/OHS management systems decisions are made on the basis of safety and effective outcomes according to requirements and established procedures
	2.2	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.3	Work teams are arranged to ensure planned goals are met according to established procedures
	2.4	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements

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	2.5	Quality of work is monitored against personal performance agreement and established organisational and professional standards
	2.6	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
	2.7	Workplace procedures for hazard identification, assessment and control of risks, and dealing with hazardous events are developed
	2.8	Manage and maintain WHS/OHS procedures and processes for dealing with hazardous events are managed and maintained according to requirements and established procedures
	2.9	Identification of all hazards at the planning, design and evaluation stages of any changes in the workplace are addressed to ensure that new hazards are not created by the proposed changes
	2.10	Procedures for selection and implementation of risk control measures are developed and maintained in accordance with the hierarchy of control
	2.11	Inadequacies in existing control measures are identified in accordance with the hierarchy of control and provide promptly resources enabling implementation of new measures
3 Complete the management of an ESI WHS/OHS management system	**3.1**	Final inspections of the WHS/OHS management systems are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and completion documents are finalised
	3.3	Reports and completion documents are submitted to relevant personnel for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the WHS/OHS management systems documents are issued and records are updated in accordance with established procedures
	3.5	WHS/OHS training needs are identified and a WHS/OHS induction and training program developed to fulfil employee's WHS/OHS training needs as a part of

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the enterprise general training program

3.6 Training management system(s) are maintained so that individual employee's WHS/OHS training needs are easily identified, training attendance monitored and non-attendance followed up

3.7 Monitoring systems for keeping WHS/OHS records to meet regulatory requirements are maintained according to WHS/OHS legislative arrangements, including identification of patterns of occupational injury and disease within area of managerial responsibility

3.8 WHS/OHS system, including policies, procedures and programs, is assessed according to organisational aims with respect to WHS/OHS

3.9 Recommendations and improvements to the WHS/OHS system are developed, documented and implemented to ensure effectiveness according to established procedures

3.10 Compliance with WHS/OHS legislative requirements and established procedures is assessed to ensure that legal WHS/OHS standards are maintained as a minimum

3.11 Appropriate personnel are notified on the outcomes of the evaluation(s) and recommendations and completion documents are finalised/commissioned according to 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 UETTDRIS66A Manage an electricity power system OHS

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management system.

Links

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Assessment Requirements for UETTDRIS66 Manage an electricity power system WHS/OHS management system

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 WHS/OHS policies and procedures
- implementing WHS/OHS policies and procedures
- maintaining WHS/OHS policies and procedures
- reporting on the principles and practices of the management of WHS/OHS, including hierarchy of control, risk management and the impact of the characteristics and composition of the workforce
- managing a system approach to WHS/OHS
- managing organisational procedures for maintaining WHS/OHS records
- developing and implementing organisational procedures for identifying hazards and assessing risks
- developing and implementing organisational procedures for controlling risks
- developing and implementing organisational procedures for dealing with hazardous events
- analysing and managing risk assessment and risk control in accordance with the hierarchy of control in the workplace
- designing and implementing appropriate WHS/OHS management systems
- investigating WHS/OHS training requirements, incidents and accidents with recommendations on action plan
- providing and making readily available relevant information to the workgroup about WHS/OHS and the organisation's WHS/OHS policies, procedures and programs on an ongoing basis
- developing and conducting two (2) information/training sessions on current WHS/OHS issues for the workforce
- dealing with unplanned events on at least one 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:

- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
  - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
  - requirements of persons prior to making bare-hand contact with dead low voltage (LV) mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and high voltage (HV) apparatus
  - safe working practices - requirements to enable safe working on conductive poles, procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit
- powerline safety practices encompassing:
  - 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, 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 and developing techniques; involvement of external emergency services; and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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
- implementation and monitoring requirements for powerline safety encompassing:
  - identification of relevant legislation, codes and government guidelines for the

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implementation and monitoring of WHS/OHS in the workplace - Commonwealth/state/territory legislation relevant to the workplace and the meaning of general duty of care under WHS/OHS legislation and common law
    - workplace WHS/OHS enterprise plan - responsibilities of each member of the work team, and review process for changing/improving WHS/OHS safety plan/standing instructions for the systematic management of WHS/OHS in the workplace
    - relationship between the WHS/OHS committee and employees - methods used to collate and distribute/disseminate WHS/OHS information, staff development activities and legislation requirements with regards to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
    - hazards associated with powerline industry - identification of hazards in the workplace, processes used and contributing factors to a hazardous situation, assessment of risks and control of WHS/OHS risks (risk management), the hierarchy of control and monitoring of risk control measures
    - risk assessment and its management in powerline industry - principles and purposes of risk management; processes for conducting risk assessment, including, risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
    - maintenance strategies for WHS/OHS programs - developing processes for promoting, maintaining and improving WHS/OHS in the workplace; and identifying techniques for the evaluating and reviewing WHS/OHS education and training programs and elements of an effective WHS/OHS management system; and WHS/OHS consultation and accident/incident investigations
- enterprise-specific policies and procedure instructions encompassing:
    - 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 - firefighting procedures, fatigue management, and training and competency development - understanding and promotion
- enterprise-specific WHS/OHS instructions encompassing:
    - 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 personal protection equipment (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

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- 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, 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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
- 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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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.

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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.

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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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UETTDRIS81 Install telecommunications infrastructure on electricity supply industry assets

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 installation of telecommunications infrastructure equipment within the communications corridor, such as cables, cable support and termination enclosures, which are relevant to the transmission of data. It includes the termination/connection of the telecommunication equipment in accordance with enterprise requirements.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE105A Fix and secure electrotechnology equipment

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

Competency Field

Industry Specific Cross Discipline

Unit Sector

Not applicable.

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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 the installation of telecommunications infrastructure equipment	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received
	1.2 Relevant requirements and established procedures for the work are communicated to relevant personnel and identified for the worksite
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation of telecommunications infrastructure equipment are obtained and confirmed for the purposes of the work to be performed
	1.4 Work is prioritised and sequenced following consultation with supervisor for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored according to established procedures
	1.6 Relevant work permits are received to access and perform work according to requirements and/or established procedures
	1.7 Resources, including equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8 Relevant personnel at worksite are confirmed with currency in first aid, pole top rescue and other related work procedures according to requirements
	1.9 Site is prepared in accordance with established procedures to minimise risk and damage to property, commerce and individuals
2 Carry out installation of telecommunications	**2.1** WHS/OHS and sustainable energy principles and practices to reduce waste are monitored and followed in

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infrastructure equipment		accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working at heights, and use of power tools/equipment, techniques and practices are safely followed
	2.3	Essential knowledge and associated skills are applied to the safe installation of telecommunications infrastructure equipment to ensure completion in an agreed timeframe, to quality standards with a minimum of waste according to requirements
	2.4	Telecommunications infrastructure equipment and associated hardware are positioned, secured and terminated/connected in accordance with requirements and established procedures
	2.5	Telecommunications infrastructure equipment and associated hardware are maintained in accordance with requirements and established procedures
	2.6	Unplanned events in the installation of telecommunications infrastructure equipment are resolved and dealt with
	2.7	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.8	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation of telecommunications infrastructure equipment	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off in accordance with established procedures

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3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are finalised and processed and appropriate 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 UETTDRIS81A Install telecommunications infrastructure on electricity supply industry assets.

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 UETTDRIS81 Install telecommunications infrastructure on electricity supply industry assets

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
- installing telecommunications infrastructure on electricity supply industry assets using any two (2) of the following:
  - cable support
  - support brackets
  - junction boxes
  - enclosures
- using any two (2) of the following:
  - ribbon optical fibre cable
  - single mode optical fibre cable
  - multi-mode optical fibre cable
  - structured aerial cabling
- 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:

- telecommunication network drawings and plans
- WHS/OHS specific requirements for telecommunication networks encompassing:
  - aerial safety equipment
  - procedures to applying pole top rescue
- hazard identification associated with telecommunication networks equipment encompassing:
  - working at heights

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  - checking exposed metal for potential differences
  - hazard and control measures in aerial cabling working environment
  - soundness of pole for aerial cabling
  - hazards associated with working with optical fibre
- aerial construction methods and regulations
- telecommunication network cables encompassing:
  - types of cables
  - cable colour coding for outdoor cable
  - colour coding of cables and termination modules and standard connectors used with twisted pair, optical fibre and coaxial cables
  - cable labelling devices
- cables protect and support requirements encompassing:
  - protection against mechanical damage
  - protection from adverse temperatures and corrosion 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 encompassing:
  - cable installation equipment
  - cable drawing and hauling techniques
- insulation removal and replacement
- conductor handling and cable terminations encompassing:
  - application of connecting devices for conductors and terminals
  - stress release on cables/conductors
  - methods of terminating cables (cables less than twenty pair, twenty pair cable and greater)
  - joining of aerial cables
- operating principles of fibre optic cable transmission encompassing:
  - types of optical fibre types available for telecommunications voice and data transmission
  - difference between multi-mode and single mode transmission
  - advantages of optical fibre cable compared to other cables
  - applications of optical fibre cables
  - requirements of optical fibre cables as specified in current standards
- installation techniques for optical fibre cables encompassing:
  - regulations, standards and codes applicable to optical fibre installation
  - bending radii and hauling requirements
  - cable support and securing mechanisms
  - safety precautions.

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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, 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

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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UETTDRIS99 Test and verify distribution remote area installations

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 test and verify distribution remote area installations in the electricity supply industry (ESI).

It includes inspection and testing to verify whether a distribution remote area installation is safe and complies with all requirements. It also includes working safely, visual inspections, mandatory, optional and functional test procedures, identifying non-compliance defects and mandatory reporting requirements.

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

UEENEEE103A Solve problems in ELV single path 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

UEENEEK101A Maintain safety and tidiness of remote area power supply systems

UEENEEK102A Work safely with remote area power supply systems

UEENEEK116A Maintain and repair remote area power generation facilities

UEENEEK120A Maintain operation of remote area power generation plant

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS32 Solve electrical problems in remote community network apparatus

UETTDRIS33 Solve electrical problems in remote community network 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 visually inspect, test and verify remote area distribution installation	**1.1** Work schedules, construction 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 accessing, testing and verification of overhead distribution installations 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed in accordance with workplace procedures
	1.7 Plant, equipment, tools and personal protective equipment (PPE) required for work are identified,

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		obtained and confirmed in working order
	1.8	Specialist test and measurement equipment for testing and verification of overhead distribution installations are obtained, confirmed in working order and calibrated in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.10	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out visual inspection, testing and verification of remote area distribution installation	**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	Testing and verification of overhead distribution installations are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4	Remote area distribution installations and associated hardware are visually inspected and confirmed as positioned, secured and terminated/connected in accordance with job requirements and workplace procedures
	2.5	Energised tests and/or measurements, as required to verify remote area distribution installations, are determined in accordance with job requirements and workplace procedures
	2.6	Remote area distribution installations are checked for suitability and compliance with workplace procedures and relevant electrical network supply industry standards
	2.7	Remote area distribution installation protection methods and devices are validated as meeting workplace procedures and relevant electrical distribution protection industry standards

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	2.8	Remote area distribution installation switchgear is validated as being appropriately rated and meeting functional requirements of workplace procedures and relevant electrical distribution network protection industry standards
	2.9	Remote area distribution installations earthing system and multiple earth neutral (MEN) system components are verified as correctly installed and conforming to workplace procedures and relevant electrical distribution network standards
	2.10	Mandatory testing of the distribution network system phasing, phase rotation, polarity, voltage and neutral conductors is undertaken and conforms to network construction standards
	2.11	Quality checks of work are undertaken in accordance with workplace procedures
3 Report inspection and test findings	**3.1**	WHS/OHS risk control work completion measures and procedures are followed
	3.2	Completed work is checked against work plan, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.3	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	3.4	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.5	Non-compliance defects are identified, corrected and/or reported in accordance with workplace procedures
	3.6	Recommendations for rectifying defects are made in accordance with workplace procedures
	3.7	Mandatory documentation is completed in accordance with workplace procedures
	3.8	Tools, equipment and surplus resources are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.9	Relevant work permits are signed off and electrical equipment (network infrastructure) returned to service in

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accordance with workplace procedures

3.10 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 UETTDRIS99A Test and Verify Distribution Remote Area Installations.

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 UETTDRIS99 Test and verify distribution remote area installations

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
- inspecting overhead distribution poles and structures
- using testing/measuring devices, including at least three (3) of the following:
  - voltage detector*
  - clamp-on ammeter
  - multimeter
  - polarity tester
  - insulation resistance tester
  - phase sequence indicator*
  - earth resistance tester
  - recording meters
  - (*must do)
- completing distribution tests, including at least three (3) of the following:
  - distribution network voltage test*
  - neutral identification test*
  - earthing system resistance test
  - distribution system load current test
  - multiple earth neutral (MEN) system loop impedance test/continuity test
  - phase sequence test
  - (*must do)
- inspecting overhead installations from at least two (2) of the following:
  - elevated work platform (EWP)
  - ladder
  - portable platform

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- using specialised protection equipment, including at least two (2) of the following:
  - insulating mats
  - temporary bridging device
  - insulating gloves
  - ladder/pole shrouds
  - equipotential bonding
  - earthing and short circuiting
- inspecting protection/switchgear equipment, including any one of the following:
  - fuse switches
  - dropout fuses
  - disconnectors
  - links fuses
  - surge arrestors
- inspecting overhead conductors, including any one of the following:
  - open wire overhead conductor
  - aerial bundled cable (ABC)/covered conductor type (CCT*)
  - low voltage (LV) services
  - (*must do)
- inspecting hardware attached to poles and structures, including any one of the following:
  - underground/overhead transition points
  - transformers
  - reactors
  - regulators.

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:

- legislated regulations, including:
  - legislation and regulations that require installations and equipment to be tested to ensure they are safe
  - the person/bodies responsible for the various aspects of ensuring distribution overhead installations are safe
  - results of tests that show a distribution remote area installation is safe for connection to the supply
  - 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 the distribution remote area installations electrical equipment are safe to use
- testing installations, including:
  - distribution system phasing, phase rotation and polarity is correct and conforms to

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network construction standards
  - electrical distribution network voltage levels comply with network supply standards
  - potential present upon distribution network neutral conductors conform to network supply standards
  - insulation resistance is adequate
  - earthing system and MEN system components are verified as correctly installed
- documentation, including:
  - results of tests conducted on a distribution remote area installation in accordance with work requirements and ensuring the distribution installation is safe
  - documents of periodic inspection and testing of distribution remote area installation and equipment in accordance with requirements
  - non-compliances and defects reported in accordance with established 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 testing and verifying distribution remote area installations
- applicable documentation, including workplace procedures, network construction standards, network supply standards, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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UETTDRRF01 Apply ESI safety rules, codes of practice and procedures for work on or near electrical 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 the knowledge and application of electricity supply industry (ESI) safety rules and codes of practice for work on or near electrical apparatus. It includes the application of relevant state and territory safety rules, codes of practice and enterprise-based procedures 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

There are no prerequisite competencies to this unit.

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 apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus**	**1.1** Relevant safety rules, codes of practice and procedures are identified and obtained
		1.2 Hazards and risk control measures for specific work functions/areas are identified and obtained
		1.3 The requirement for access authority/work permits required for work are identified and obtained from appropriate personnel according to established procedures
		1.4 Safety systems and equipment for work are prepared and placed to minimise and control hazards in accordance with established procedures
2	**Carry out application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus**	**2.1** Workplace procedures and work instructions for controlling risk are followed
		2.2 Safety rules, codes of practice and workplace procedures for induction to a worksite, are followed
		2.3 Specific workplace systems and equipment isolation procedures are followed
		2.4 Restricted workplace areas are identified, including ingress and egress procedures
		2.5 Emergency procedures are identified, including assembly areas, and communication systems, including audible alarms and processes, according to established procedures
3	**Complete the application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus**	**3.1** Processes for completing work are applied, and access authority/work permits, where required, 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.

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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 UETTDRRF01B Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus.

Links

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Assessment Requirements for UETTDRRF01 Apply ESI safety rules, codes of practice and procedures for work on or near electrical 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 safe approach distances (SAD) to:
  - personnel
  - vehicles
  - insulated mobile plant
  - non-insulated mobile 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:

- working on or near electrical network infrastructure encompassing:
  - identifying documentation, procedures and instructions for work on or near electrical apparatus
  - identifying and assessing hazards and control measures
  - SAD for work on or near electrical apparatus
- maintaining SAD for work on or near electrical 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.

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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 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 applying ESI safety rules, codes of practice and procedures for work on or near electrical apparatus
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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UETTDRRF02 Perform pole top rescue

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 pole top rescue procedures as an emergency procedure required in the workplace. It specifies the mandatory requirements of rescue from a pole top and how they apply in the context of transmission, distribution and rail work functions. It encompasses responsibilities for rescue, 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.
1 Prepare to perform pole	**1.1** Instruction in hazards and risk control measures for

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top rescue		specific work functions and work areas are identified and obtained (This will include the risk assessment and control measures taken by the individual performing the rescue)
	1.2	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 pole top rescue	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing the pole top and removing the victim, where necessary, from contact with live apparatus are followed
	2.3	Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR), if required, at the site and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the pole top 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF02B Perform pole top rescue.

Links

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Assessment Requirements for UETTDRRF02 Perform pole top rescue

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 work health and safety (WHS)/relevant occupational health and safety (OHS) requirements, including the use of risk control measures
- inspecting and placing rescue equipment
- performing pole top rescue 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 pole top rescue of a victim encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances (SAD) appropriate to pole top rescue
  - involvement of external emergency services
- emergency procedures for the pole top rescue of a victim encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to pole top rescue
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must 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 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 pole top rescue
- 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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UETTDRRF03 Perform EWP rescue

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 an elevated work platform (EWP) in the workplace. It specifies the mandatory requirements of rescue from a raised EWP by a work party member on the ground 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 EWP rescue procedures	**1.1**	Instruction in hazards and risk control measures for specific work areas and work activities are identified and obtained
	1.2	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 EWP rescue procedures	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for removing the victim, where necessary, from contact with or in vicinity of live apparatus and lowering the EWP to the ground are followed
	2.3	Workplace procedures for removing the victim from the EWP are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR), if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the EWP 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF03B Perform EWP rescue.

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 UETTDRRF03 Perform EWP rescue

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
- identifying operational instructions and confirming the function of emergency equipment to facilitate rescue from an incident on an elevated work platform (EWP)
- accessing controls and lowering the EWP in accordance with mobile equipment instructions/workplace procedures
- removing the victim from the EWP to the ground 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 EWP rescue of a victim encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances (SAD) appropriate to EWP rescue
  - involvement of external emergency services
  - emergency retrieval systems
- emergency procedures required to undertake EWP rescue of a victim encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to EWP rescue
  - practical steps in rescuing a person
  - removing victim to safe location/place of safety.

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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 for performing EWP rescue
- 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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UETTDRRF04 Perform tower rescue

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 an electricity supply industry (ESI) tower in the workplace. It specifies the mandatory requirements of rescue from an ESI tower 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.
1 Prepare to perform tower	**1.1** Instruction in hazards and risk control measures for

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rescue		specific work areas and work activities are identified and obtained
	1.2	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 tower rescue	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing the tower, removing the victim, where necessary, and from contact with live apparatus and are followed
	2.3	Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR) if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the performance of the tower rescue procedure	**3.1**	Processes for reporting to 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 UETTDRRF04B Perform tower rescue.

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Assessment Requirements for UETTDRRF04 Perform tower rescue

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
- performing tower rescue 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 tower rescue of a victim encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures where appropriate
  - safe approach distances SAD appropriate to tower rescue
  - involvement of external emergency services
- emergency procedures required for tower rescue of a victim encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to tower rescue
  - steps in rescuing a person
  - removing victim to safe location/place of safety.

Assessment Conditions

Assessors must hold credentials specified within the Standards 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 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 tower rescue
- 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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UETTDRRF05 Perform rescue from switchyard structures at heights

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 switchyard structures at heights in the workplace. It specifies the mandatory requirements of rescue from switchyard structures 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 from switchyard structures at heights	**1.1**	Instruction in hazards and risk control measures for specific work areas and work activities are identified and obtained
	1.2	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 switchyard structures at heights	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for accessing the switchyard structure, and removing the victim, where necessary, from contact with live apparatus are followed
	2.3	Workplace procedures for attaching the emergency lowering equipment and lowering the victim to the ground are followed
	2.4	Workplace procedures for carrying out cardiopulmonary resuscitation (CPR) if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete rescue procedures from switchyard structures at heights	**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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF05B Perform rescue from switchyard structures at heights.

Links

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Assessment Requirements for UETTDRRF05 Perform rescue from switchyard structures at heights

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 emergency rescue equipment
- performing a rescue from switchyard structures 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 switchyard structures at heights encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances SAD appropriate to rescue from switchyard structures at heights
  - involvement of external emergency services
- emergency procedures required for the rescue of a victim from switchyard structures at heights encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining SAD appropriate to rescue from switchyard structures at heights
  - steps to rescuing a person
  - 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 switchyard structures at heights
- 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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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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UETTDRRF07 Perform cable pit/trench/excavation rescue

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 cable pit/trench/excavation rescue procedures as they apply to live low voltage (LV) cable jointing in the workplace. It specifies the mandatory requirements of rescue from a cable pit/trench/excavation 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 cable pit/trench/excavation rescue	**1.1** Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained
	1.2 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 cable pit/trench/excavation rescue	**2.1** Workplace procedures and work instructions for controlling risk are followed
	2.2 Workplace procedures for accessing the cable pit/trench/excavation, and removing the victim, where necessary, from contact with live apparatus are followed
	2.3 Workplace procedures for removing the victim, where necessary, from the cable pit/trench/excavation are followed
	2.4 Workplace procedures for carrying out cardiopulmonary resuscitation (CPR), if required at the site, and treatment, where necessary, by medical professionals are followed
	2.5 The worksite is secured and entry controlled until appropriate authorities release the site
3 Complete the cable pit/trench/excavation rescue procedures	**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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRRF07B Perform cable pit/trench/excavation rescue.

Links

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Assessment Requirements for UETTDRRF07 Perform cable pit/trench/excavation rescue

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 for a cable pit/trench/excavation rescue
- performing a rescue from a pit/trench/excavation 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 cable pit/trench/excavation encompassing:
  - inspection of rescue equipment
  - assessing hazards to rescuer, victim and others
  - isolation procedures, where appropriate
  - safe approach distances (SAD) appropriate to cable pit/trench/excavation rescue
  - involvement of external emergency services
- emergency procedures for the skills required for the rescue of a victim from a cable pit/trench/excavation encompassing:
  - placement of rescue equipment
  - controlling hazards to rescuer, victim and others
  - maintaining (SAD appropriate to cable pit/trench/excavation rescue
  - removing victim to safe location/place of safety.

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 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 cable pit/trench/excavation rescues
- 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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UETTDRRF08 Perform EWP controlled descent escape

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 elevated work platform (EWP) controlled descent escape procedures in the workplace. It specifies the mandatory requirements for self-rescue from a raised EWP 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

There are no prerequisite competencies to this unit.

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.
1 Prepare to perform EWP controlled descent escape	**1.1** Instruction in hazards and risk control measures for specific work areas and work activities are identified

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		and obtained
	1.2	Tools and emergency descent equipment are checked for safety and function to ensure accessibility according to established procedures
2 Carry out EWP controlled descent escape	**2.1**	Workplace procedures and work instructions for controlling risk are followed
	2.2	Workplace procedures for evacuating an EWP basket employing emergency descent equipment are followed
	2.3	The worksite is secured and entry controlled until appropriate authorities inspect and release the site
3 Complete the EWP controlled descent escape 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 UETTDRRF08B Perform EWP controlled descent escape.

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 UETTDRRF08 Perform EWP controlled descent escape

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
- accessing, inspecting, securing and attaching emergency descent equipment to self in accordance with workplace procedures
- evacuating the elevated work platform (EWP) and descending to the ground 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:

- procedures for EWP controlled descent escape encompassing:
  - inspection of rescue equipment
  - assessing hazards to self and others
  - involvement of external emergency services as appropriate
  - safe approach distances (SAD) appropriate to EWP controlled descent escape
- procedures required for EWP controlled descent escape encompassing:
  - fitting of rescue equipment
  - controlling hazards to self and others
  - maintaining SAD for an EWP controlled descent escape
  - removing self to safe location/place of safety

Assessment Conditions

Assessors must hold credentials specified within the Standards 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 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 EWP controlled descent escapes
- 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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UETTDRRF09 Apply access procedures to work on or near electrical network infrastructure

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 the procedures to gain access for work on or near electrical network infrastructure in the context of transmission, distribution or rail work functions. It encompasses responsibilities for 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 sate and territory legislative and regulatory licencing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

There are no prerequisite competencies to this unit.

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.
1 Prepare to apply access authority procedures for	**1.1** Rules/codes of practice for work on or near electrical hazards and risk control measures for specific work

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	work on or near electrical network infrastructure		areas and work activities are identified and obtained
		1.2	Procedures for access authority/work permits, including roles and responsibilities, are obtained, learnt, understood and tested according to established procedures
		1.3	Access authority/work permit document is identified, obtained, learnt and understood for a specific work activity according to established procedures
2	**Carry out access authority procedures for work on or near electrical network infrastructure**	**2.1**	Workplace procedures for confirming personnel are appropriately qualified and fit for purpose are followed according to established procedures
		2.2	Safe approach distances (SAD) and safety measures applicable to the work activity are identified and confirmed according to established procedures
		2.3	Workplace procedures for signing on to an access authority/work permit are followed
		2.4	Workplace procedures for individuals to sign on to a specific role/function identified for the work is followed according to established procedures
		2.5	Workplace procedures confirming issue and commencement of work under an access authority/work permit document are communicated according to established procedures
3	**Complete access authority procedures for work on or near electrical network infrastructure**	**3.1**	Workplace procedures confirming work completion or suspension is communicated in accordance with established procedures
		3.2	Workplace procedures to ensure all personnel signed on to an access authority/work permit document are signed off in accordance with established procedures
		3.3	Workplace procedures to cancel or suspend an access authority/work permit document are performed 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 UETTDRRF09B Apply access procedures to work on or near electrical network infrastructure.

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 UETTDRRF09 Apply access procedures to work on or near electrical network infrastructure

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
- following workplace procedures for signing on to and off from an access authority/work permit.

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:

- working on or near electrical network infrastructure encompassing:
  - rules/codes of practice for work on or near electrical hazards and risk control measures for specific work areas and work activities
  - documentation, roles, responsibilities and procedures for a permit to work system
  - access authority/work permit document for a specific work activity according to established procedures
  - safe approach distances (SAD) and safety measures applicable to the work activity according to established procedures
  - sign on and sign off procedures for an access authority/work permit document
  - workplace procedures to cancel or suspend an access authority/work permit document
  - workplace communication procedures to confirm work is completed or suspended
  - workplace procedures for signing on to a specific role/function identified on an access authority/work permit
- skills required to work on or near electrical network infrastructure encompassing:
  - sign on and sign off an access authority/work permit document in accordance with 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 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 applying access procedures to work on or near electrical network infrastructures
- 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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UETTDRRF10 Provide first aid in an ESI environment

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 provision of first aid in an electricity supply industry (ESI) environment. It includes the recognition and provision of an initial response where first aid is required in emergency situations by providing essential first aid using basic life support measures according to established workplace first aid policies and procedures.

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.
1 Prepare to provide first aid in an ESI environment	**1.1** Physical hazards and risks to personal and others' health and safety are identified according to established

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		procedures
	1.2	The situation is assessed and actions required decided
	1.3	Assistance is sought from others, if required
2 Carry out the provision of first aid in an ESI environment	**2.1**	The victim's physical condition and visible vital signs are assessed
	2.2	First aid is provided to stabilise the victim's condition in accordance with recognised first aid procedures
	2.3	Available first aid equipment is used as appropriate
	2.4	Emergency services appropriate to the situation are notified
	2.5	Information about the victim's condition is conveyed accurately and clearly to emergency services personnel or health professionals
3 Complete provision of first aid in an ESI environment	**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 UETTDRRF10B Provide first aid in an ESI environment.

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 UETTDRRF10 Provide first aid in an ESI environment

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
- checking site for danger to self, victim and others
- completing the management of electrical burns plus one other of the following:
    - bites or stings
    - shock
    - bleeding
    - electrical shock
- monitoring and managing victim
- raising alarm with emergency services.

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 include knowledge of:

- provision of first aid in an emergency situation encompassing:
    - assessing hazards to rescuer, victim and others
    - involvement of external emergency services
    - the treatment of electrical burns, shock, bites, stings, bleeding and electric shock
- skills required to provide first aid in an emergency situation encompassing:
    - controlling hazards to rescuer, victim and others
    - use of available first aid equipment and resources
    - injury management using first aid principles.

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 providing first aid in an ESI environment
- 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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UETTDRRF11 Testing of connections to low voltage electricity networks

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 testing of connections to low voltage (LV) electricity networks according to AS 4741-2010 Testing of connections to electricity networks. It specifies the mandatory requirements for testing when connecting and/or reconnecting a customer's installation to an electricity supply network.

It encompasses the minimum principles and tests required to confirm that the LV supply connections are correct,

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

There are no prerequisite competencies to this unit.

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 test procedures**	**1.1** Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained
		1.2 Tools and equipment needed for testing are checked for inspection date, safety and functionality
2	**Carry out test procedures**	**2.1** Workplace procedures and work instructions for controlling risk are followed
		2.2 Test procedures are conducted in accordance with AS 4741-2010 Testing of connections to electricity networks
		2.3 Enterprise procedures for corrective actions are followed
		2.4 Test results are documented in accordance with established enterprise procedures
3	**Complete the test procedures**	**3.1** Processes for reporting 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 UETTDRRF11A Testing of connections to low voltage electricity networks.

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 UETTDRRF11 Testing of connections to low voltage electricity networks

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
- preparing and using of test equipment
- preparing and correctly using personal protective equipment (PPE)
- testing of single phase and multi-phase connections to network operator's procedures
- documenting test results to network operator's 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:

- low voltage (LV) testing of network connections encompassing:
  - selection and inspection of test equipment relevant for the testing procedures
  - acceptable neutral voltage criteria
  - polarity testing
  - neutral integrity testing
  - phase rotation testing
  - phasing confirmation
  - corrective actions to network operator's procedures
  - recording and reporting results to network operator's procedures
- skills required to test LV network connection encompassing:
  - preparation and use of test equipment
  - preparation and correct use of PPE
  - testing of single phase and multi-phase connections to network operator's procedures
  - documenting test results to network operator's 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 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 testing of connections to LV electricity networks
- 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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UETTDRRT21 Install traction overhead wiring 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 traction overhead wiring systems in the electricity supply industry (ESI).

It includes undertaking safe working practices on or about the running line/track, preparing for profiling including isolating systems and circuits for safe working in accordance with work plans. It also includes identifying and implementing road/rail management plans, procedures of issuing/accepting electrical permits, confirming equipment and associated hardware is correctly installed, prior to service and updating installation data and relevant quality assurance documentation.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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Competency Field

Rail Traction

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 install overhead traction wiring systems	**1.1** Work schedules, construction 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 the installation of overhead traction wiring systems 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained to access rail corridor and signed 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

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	1.8	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with track protection officer and/or network control officer and workplace procedures
	1.9	Road/rail management plan is identified and implemented in accordance with workplace procedures
	1.10	Environmental constraints applicable to work are identified and control measures applied
2 Installation of overhead traction wiring systems	**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	Systems and circuits are checked and isolated and proved safe to work and in accordance with job requirements, work permits and workplace procedures
	2.4	Installation of overhead traction wiring systems is completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.5	Overhead traction wiring systems, including cables, fittings, traction conductors and associated equipment, are installed in accordance with work schedule, job requirements and workplace procedures
	2.6	Profiling is completed in accordance with workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation of overhead traction wiring 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	WHS/OHS and environmental incidents are reported in

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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 and the overhead traction wiring system 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 UETTDRRT21A Install traction overhead wiring 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 UETTDRRT21 Install traction overhead wiring 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
- using at least four (4) of the following types of system equipment and fittings:
  - support structure
  - span
  - section insulator
  - neutral section
  - midpoint anchor
  - support equipment
  - tension regulators
  - stay/guy wire
  - tramway support network
- using at least two (2) of the following types of traction conductors and cables:
  - catenary
  - dropper
  - contact/trolley*
  - feeder
  - earth conductor
  - drape/potential jumper
  - (*must do)
- operating from at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)
  - ladder
  - mobile platform
- obtaining relevant equipment, tools and personal protective equipment (PPE) required for installing traction overhead wiring systems, including using at least two (2) of the following:

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  - tensioning equipment*
  - specialised tools
  - ropes
  - geometry profiling equipment
  - (*must do)
- 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:

- electrical wiring system components - earth wires, feeder wire, return conductor, insulators, catenary wire, contact/trolley wire, droppers, tensioning equipment, current collectors, tram support networks, tram fittings and bridge/tunnel fittings
- electrical traction circuits, including:
  - types
  - applications
- relationship of the components, apparatus and the conductors to the operation of the traction system
- effective current collection and wire interface
- effective registration in the traction power system
- profiling overhead traction wire methods, including:
  - factors that impact on current collectors
  - methods to achieving smooth current collector transitions and interfaces
- dynamic and static forces, including:
  - types that effect traction systems
  - effects on effective registration
  - techniques to minimise the adverse effects
- standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to the electrical traction
- electrical traction voltage and current circuit paths, including:
  - transmission distribution voltages
  - traction supply system and voltages
  - return and stay current paths, including electrolysis
- relationship of sectioning, section insulator and overlaps/air gaps in a traction power system
- traction power system components, including:
  - function of transformer/rectifiers
  - configuration and purpose of traction overhead wiring systems
  - function of isolators/switches
  - function of the circuit breaker
- reliability and security of traction supply.

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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 PPE currently used in industry for installing traction overhead wiring systems
- 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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UETTDRRT22 Maintain traction overhead wiring 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 maintain traction overhead wiring systems in the electricity supply industry (ESI).

It includes maintaining and repairing overhead traction wiring systems on or about the running line/track and preparing for stringing and profiling, including isolating systems and circuits for safe working. It also includes diagnosing faults, modifying and adjusting to appropriate standards, identifying and implementing road/rail management plans, issuing/accepting electrical permits, recommissioning tests to ensure integrity of traction system prior to returning to service and updating system data and/or maintenance records.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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UETTDRRT21 Install traction overhead wiring systems

Competency Field

Rail Traction

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 maintain overhead traction wiring systems	**1.1** Work schedules, construction 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 the maintenance of overhead traction wiring systems 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed 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

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	1.8 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with track protection officer and/or network control officer and workplace procedures
	1.9 Road/rail management plan is identified and implemented in accordance with workplace procedures
	1.10 Environmental constraints applicable to work are identified and control measures applied
2 Perform maintenance on overhead traction wiring systems	**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 Systems and circuits are isolated, as required, and proved safe to work on in accordance with job requirements, work permits and workplace procedures
	2.4 Overhead traction wiring systems are maintained in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.5 Maintenance, including repair and/or replacement of overhead traction wiring systems, including the modification and re-adjustment of overhead traction conductors, is performed 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 with workplace procedures
	2.8 Recommissioning checks and tests are performed to ensure integrity of system prior to returning to service
3 Complete maintenance on overhead traction wiring systems	**3.1** Completed work is checked against works 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 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 and the overhead traction wiring system 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 UETTDRRT22A Maintain traction overhead wiring 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 UETTDRRT22 Maintain traction overhead wiring 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
- using at least four (4) of the following types of system equipment and fittings:
  - support structure
  - span
  - section insulator
  - neutral section
  - midpoint anchor
  - support equipment
  - tension regulators
  - stay/guy wire
  - tramway support network
- using at least two (2) of the following types of traction conductors and cables:
  - catenary
  - dropper
  - contact/trolley*
  - feeder
  - earth conductor
  - drape/potential jumper
  - (* must do)
- operating form at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)
  - ladder
  - mobile platform
- obtaining equipment, tools and personal protective equipment (PPE) required for overhead rail traction wiring systems, including using at least two (2) of the following types of tools

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and equipment:
  - tensioning equipment*
  - specialised tools
  - ropes
  - geometry profiling equipment
  - (* must do)
- dealing with unplanned events on at least (1) one 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:

- electrical wiring system components, including:
  - catenary wire, contact/trolley wire, droppers, feeder wire, return conductor, insulators, surge arresters, cantilevers, tensioning equipment, tram support network, tram fittings, bridge/tunnel fittings and current collectors
- electrical traction circuits, including:
  - types
  - applications
- relationship of the components, apparatus and conductors to the operation of the traction system
- effective current collection and wire interface
- effective registration in the traction power system
- dynamic and static forces, including:
  - types that effect traction systems
  - effects on effective registration
  - techniques to minimise adverse effects
- safe and effective use of repair and maintenance tools, equipment and machinery
- maintenance of overhead traction wiring systems, including:
  - types of equipment and components
  - types and function of tools and equipment
  - maintenance/repair procedures
  - inspection and recording procedures
- diagnosis and correction of simple faults in specific overhead wiring systems, including:
  - types and causes
  - determination of appropriate corrective actions
  - repair and replace procedures for overhead wiring systems.

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 PPE currently used in industry for maintaining traction overhead wiring systems
- 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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UETTDRRT23 Install rail traction bonds

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 rail traction bonds in the electricity supply industry (ESI).

It includes the installation of temporary and permanent traction bonds, bonding cables and using safe working practices on or about the running line/track. It also includes isolating systems and circuits for safe working in accordance with work plans, identifying and implementing traffic management plans, issuing/accepting electrical permits, checks to confirm bonds, bonding cables and associated hardware have been correctly installed and are in a safe condition to test prior to putting into service, undertaking pre-commissioning tests and updating installation data and relevant quality assurance documentation.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

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UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

Competency Field

Rail Traction

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 install traction bonds	**1.1** Work schedules, construction 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 the installation of traction bonds 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained to access rail corridor, understood and signed 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

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	1.8 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with track protection officer and/or network control officer and workplace procedures
	1.9 Traffic management plan is confirmed as being applied in accordance with workplace procedures
	1.10 Environmental constraints applicable to work are identified and control measures applied
2 Perform installation of traction bonds	**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 Systems and circuits are checked, isolated and proved safe to work on in accordance with workplace procedures
	2.4 Installation of traction bonds and bonding cables are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.5 Cable and surrounds, including rail and other surfaces, are prepared for jointing and terminating in accordance with workplace procedures
	2.6 Traction bonds are installed and tested in accordance with job requirements and workplace procedures
	2.7 Unplanned events are responded to in accordance with workplace procedures
	2.8 Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation of traction bonds	**3.1** Completed work is checked and tested against works schedule, construction plans and drawings for compliance and anomalies reported in accordance with workplace procedures
	3.2 Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures

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3.3 Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures

3.4 Relevant work permits are signed off and, the system that has undergone the installation of a traction bond/s is returned to service 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT23A Install rail traction bonds.

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 UETTDRRT23 Install rail traction bonds

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
- installing rail traction bonds on at least two (2) of the following types of connecting bond cables and components, including:
  - covered or bare aluminium bonds
  - copper bonds
  - steel bonds
  - steel rail
- obtaining equipment, tools and personal protective equipment (PPE) required for installing rail traction bonds that includes using at least three (3) of the following types of tools and equipment:
  - bonding specific tools
  - crimping devices
  - thermal moulds
  - rail drill
  - bonding fittings
  - explosive power tools
  - portable hand tools
- 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:

- traction bond and cables, including:
  - permanent bonding methods

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  - applications for permanent bonding
  - components of permanent bonds
  - interface between traction and signalling circuits
- safe working procedures/practices when carrying out permanent bonding, including:
  - PPE
  - electrical and visual testing using PPE
- installation of temporary traction bonds and cables, including:
  - types and purpose of tools and equipment
  - installation and removal methods
  - testing for electrical integrity of bonds and cables
- installation of permanent traction bonds and cables, including:
  - types and purposes of tools and equipment
  - installation and removal methods
  - testing for electrical integrity of bond, cables 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 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 installing rail traction bonds
- 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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UETTDRRT24 Maintain rail traction bonds

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 rail traction bonds in the electricity supply industry (ESI).

It includes maintaining and repairing temporary and permanent traction bonds, bonding cables and using safe working practices on or about the running line/track. It also includes isolating systems and circuits in accordance with work plans, identifying and implementing traffic management plans, issuing/accepting electrical permits, inspecting and checking equipment and associated hardware are in a safe condition to test and/or return to service, recommissioning tests to ensure integrity of bonding system prior to return to service and updating of system data/maintenance records.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

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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

Competency Field

Rail Traction

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 maintenance of traction bonds	**1.1** Work schedules, construction 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 the maintenance of traction bonds 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and

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		signed 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 track protection officer and/or network control officer and workplace procedures
	1.9	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.10	Traffic management plan is identified and implemented in accordance with workplace procedures
	1.11	Environmental constraints applicable to work are identified and control measures applied
2 Perform maintenance of traction bonds	**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	Systems and circuits are checked, isolated and proved safe to work on in accordance with workplace procedures
	2.4	Maintenance and repair of traction bonds and bonding cables are completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.5	Cable and surrounds, including rail and other surfaces, are prepared for jointing and terminating in accordance with workplace procedures
	2.6	Maintenance testing is performed in accordance with the 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	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete maintenance of traction bonds	**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	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.3	Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Relevant work permits are signed off and the system that has undergone the maintenance of a traction bond/s is returned to service 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT24A Maintain rail traction bonds.

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 UETTDRRT24 Maintain rail traction bonds

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 correcting simple faults in traction bonds that includes at least two (2) of the following types of connecting bond cables and components:
  - covered or bare aluminium bonds
  - copper bonds
  - steel bonds
  - steel rail
- maintaining and repairing traction bonds that includes at least three (3) of the following types of connecting bond cables and components:
  - bonding specific tools
  - crimping devices
  - thermal moulds
  - rail drill
  - bonding fittings
  - explosive power tools
  - portable hand tools
- 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:

- traction bond and cables, including:
  - temporary and permanent bonding methods
  - applications for temporary and permanent bonding

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  - components of temporary and permanent bonds
  - interface between traction and signalling circuits
- safe working procedures/practices when carrying out temporary and permanent bonding, including:
  - personnel protective equipment (PPE)
  - electrical and visual testing using PPE
- installation and removal of temporary traction bonds and cables, including:
  - types and purpose of tools and equipment
  - installation and removal methods
  - testing for electrical integrity of bonds and cables
- maintenance of traction bond, including:
  - types and components
  - types and function of tools and equipment
  - maintenance/repair procedures
  - inspection and recording procedures
- diagnosis and correction of simple faults in specific traction bonds, including:
  - types and causes
  - determination of appropriate corrective actions
  - repair and replace procedures
- installation and removal of permanent traction bonds and cables, including:
  - types and purposes of tools and equipment
  - installation and removal methods
  - testing for electrical integrity of bond, cables and equipment
- maintenance and repair of permanent traction bonds, cables 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 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

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industry for maintaining rail traction bonds
- 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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UETTDRRT25 Install overhead rail traction configurations

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 overhead rail traction configurations in the electricity supply industry (ESI).

It includes installation of overlaps, cross-overs, turnouts and crossing configurations by using safe working practices on or about the running line/track. It also includes isolating systems and circuits, identifying and implementing traffic management plans, issuing/accepting electrical permits inspection and checks to confirm equipment and associated hardware have been correctly installed in a safe condition to test prior to putting into service, pre-commissioning tests and updating installation data and relevant quality assurance documentation.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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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

Competency Field

Rail Traction

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 installation of overhead traction configurations	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are received and confirmed
	1.2 Job requirements and workplace procedures are identified and communicated with relevant
	1.3 Work health and safety (WHS)/occupational health and safety (OHS), environmental and workplace procedures for the installation of overhead traction configurations 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed in

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		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 track protection officer and/or network control officer and workplace procedures
	1.9	Traffic management plan is confirmed as being applied in accordance with workplace procedures
	1.10	Environmental constraints applicable to work are identified and control measures applied
2 Perform installation of overhead traction configurations	**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	Systems and circuits are checked, isolated and proved safe in accordance workplace procedures
	2.4	Installation of overhead traction configurations are completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.5	Electrical equipment and associated hardware are positioned, secured and terminated/connected in accordance with job requirements and workplace procedures
	2.6	Overhead traction configurations are installed in accordance with job requirements and workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures
	2.8	Quality checks of work are undertaken in accordance with workplace procedures

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3 Complete installation of overhead traction configurations	**3.1** Completed work is checked against works schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2 Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.3 Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.4 Relevant work permits are signed off after final inspections and the system is energised, tested and returned to service 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT25A Install overhead rail traction configurations.

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 UETTDRRT25 Install overhead rail traction configurations

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
- using at least three (3) of the following types of system configurations:
  - overlap
  - cross-over
  - turnout crossings
  - train/tram crossing
- operating from at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)
  - road/rail traction height access equipment
  - ladders
- obtaining equipment, tools and personal protective equipment (PPE) required for installing overhead rail traction configurations that includes at least two (2) of the following types of height and stagger measuring equipment:
  - height gauge
  - stagger gauge
  - cant gauge
- isolating systems and circuits that includes at least one (1) of the following types of testing equipment for overhead traction conductor configurations:
  - voltage detector (low voltage (LV) or high voltage (HV))
  - voltmeter
  - insulation resistance tester
  - field intensity tester
- 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:

- traction configuration principles, including:
  - types
  - purpose
  - assemblies
  - sub-assemblies
  - components
- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings, including:
  - types of components
  - types and function of tools and equipment
- installation of traction configurations, including:
  - installation methods
  - measurement of tolerances
  - recording of tolerances.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 installing overhead rail traction configurations
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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UETTDRRT26 Maintain overhead rail traction configurations

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 overhead rail traction configurations in the electricity supply industry (ESI).

It includes maintaining and repairing overlaps, cross-overs, turnouts and crossings whilst using safe working practices on or about running line/track. It also includes repairing and/or replacing electrical equipment and associated hardware, identifying and implementing traffic management plans, issuing/accepting electrical permits, isolation of systems and circuits, inspection and checks to confirm equipment and associated hardware are in a safe condition to test and/or return to service, re-commissioning tests to ensure the integrity of the traction system prior to return to service and updating of system data and/or maintenance records.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

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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

UETTDRRT25 Install overhead rail traction configurations

UETTDRRT27 Install overhead traction components and equipment

UETTDRRT28 Maintain overhead traction components and equipment

Competency Field

Rail Traction

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 maintain overhead traction configurations	**1.1** Work schedules, construction 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 the maintenance of overhead traction configurations 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 identified in accordance with

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		workplace procedures
	1.6	Relevant work permits are obtained to access rail corridor, understood and signed 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
	1.10	Environmental constraints applicable to work are identified and control measures applied
2 Perform maintenance of overhead traction configurations	**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	Systems and circuits are checked, isolated and proved safe to work on in accordance with workplace procedures
	2.4	Maintenance of overhead traction configurations is completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.5	Electrical equipment and associated hardware are tested in accordance with job requirements and workplace procedures
	2.6	Maintenance, including repair and/or replacement of overhead traction configurations, is completed 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	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete maintenance of overhead traction configurations	**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	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.3	Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Relevant work permits are signed off after final inspections and recommissioning checks and the system is energised, tested and returned to service 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT26A Maintain overhead rail traction configurations.

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 UETTDRRT26 Maintain overhead rail traction configurations

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
- obtaining equipment, tools and personal protective equipment (PPE) required for maintaining overhead rail traction configurations that includes at least three (3) of the following types of height and stagger measuring equipment:
  - overlap
  - cross-over
  - turnout crossings
  - train/tram crossing
- using at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)
  - road/rail traction height access equipment, such as ladders
- obtaining equipment, tools and PPE required for maintaining overhead rail traction configurations that includes at least two (2) of the following types of height and stagger measuring equipment:
  - height gauge
  - stagger gauge
  - cant gauge
- isolating systems and circuits that includes at least one (1) of the following types of testing equipment for overhead traction conductor configurations:
  - voltage detector (low voltage (LV) or high voltage (HV))
  - voltmeter
  - insulation resistance tester
  - field intensity tester
- 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:

- traction configuration principles, including:
  - types
  - purpose
  - assemblies
  - sub-assemblies
  - components
- maintenance of traction configurations, including:
  - types of components
  - types and function of tools and equipment
  - maintenance/repair procedures
  - inspection and recording procedures
- diagnosis and correction of simple faults in specific traction configurations, including:
  - types and causes
  - determination of appropriate corrective actions
  - repair and replace procedures for components of specific configurations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 maintaining overhead rail traction configurations
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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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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UETTDRRT27 Install overhead traction components and 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 install overhead traction components and equipment in the electricity supply industry (ESI).

It includes installing associated hardware whilst undertaking safe working practices on or about the running line/track, isolating systems and circuits, identifying and implementing road/rail management plans and issuing/accepting electrical permits.

It also includes inspecting and checking to confirm equipment, components and associated hardware have been correctly installed in accordance with design and are in a safe condition to test prior to putting into service, undertaking pre-commissioning tests to ensure integrity of traction system prior to putting back into service and updating installation data and relevant quality assurance documentation.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

Competency Field

Rail Traction

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 installation of overhead traction equipment/components	**1.1** Work schedules, construction 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 the installation of overhead traction equipment/components 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained to access rail corridor, understood and signed in accordance with workplace procedures

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	1.7	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 track protection officer and/or network control officer and workplace procedures
	1.9	Road/rail management plan is identified and implemented in accordance with workplace procedures
	1.10	Environmental constraints applicable to work are identified and control measures applied
2 Perform installation of overhead traction equipment/components	**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	Systems and circuits are checked, isolated and proved safe to work on in accordance with workplace procedures
	2.4	Installation of overhead traction equipment/components are completed in agreed timeframes, to quality standards and with minimum of waste in accordance with job requirements and workplace procedures
	2.5	Electrical components/equipment and associated hardware are positioned, secured and terminated/connected in accordance with job requirements and workplace procedures
	2.6	Unplanned events are responded to in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation of overhead traction equipment/components	**3.1**	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 Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures

3.3 Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures

3.4 Relevant work permits are signed off and overhead traction equipment/components are commissioned 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.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT27A Install overhead traction components and 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 UETTDRRT27 Install overhead traction components and 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
- using at least two (2) of the following types of equipment:
  - fuse switches
  - dropout fuses
  - section insulators
  - switches/isolators
  - links
  - fuses
  - surge diverters
  - transformers
- using at least five (5) of the following types of components:
  - cantilever hardware
  - head span
  - neutral sections
  - pull offs
  - registration fittings
  - steady span
  - tension regulators
  - cross spans
  - tramway support network
  - pendulum
- using at least two (2) of the following types of fittings:
  - preformed fittings
  - compression fittings

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  - wedge fittings
  - bolted splices
- using at least three (3) of the following types of connecting components:
  - feeders
  - dissimilar conductors
  - lugs
  - bolted clamp
  - drapes/potential jumper
  - droppers
- obtaining equipment, tools and personal protective equipment (PPE) required for installing overhead traction components and equipment that includes at least two (2) of the following types of tools and equipment:
  - voltage detectors
  - micrometer/gauge
  - tension wrench
  - dynamometer
  - specialised tools
- 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:

- types and purpose of overhead traction equipment, including:
  - switches/isolators, fuse switches, links, section insulators, and fuses
- types and purpose of overhead components, including:
  - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators and cross spans
- types of conductors used for overheads wiring, such as hard-drawn; cadmium copper (CAD); and tin-bearing copper, aluminium, steel and other alloyed conductors
- types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs
- types and purpose of ancillary equipment including:
  - surge arresters, booster and auxiliary transformers
- methods for installing conductors, such as:
  - preformed fittings
  - compression fittings
  - wedged fittings
  - bolted splices
  - lugs

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    - bolted clamps
- methods for installing components, such as:
    - feeders
    - droppers
    - dissimilar conductors
    - jumpers
    - surge arresters
- use of plant and equipment for installation work, such as:
    - elevated work platforms (EWP)
    - ladders
    - works trains
    - rail-mounted overhead wiring equipment/vehicles
    - road/rail height access machinery/vehicles
    - voltage detectors
    - micrometer/gauges
    - tension wrenches
    - dynamometers
    - other specialised 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 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 installing overhead traction components and equipment
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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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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UETTDRRT28 Maintain overhead traction components and 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 maintain and repair overhead traction electrical equipment, components and associated hardware in the electricity supply industry (ESI).

It includes repairing or replacing electrical components/equipment and associated hardware, undertaking safe working practices on or about the running line/track, isolation of systems and circuits for safe working, identifying and implementing road/rail management plans, and issuing/accepting electrical permits. It also includes inspecting and checking equipment, components and associated hardware are in a safe condition to test and/or return to service, re-commissioning tests of electrical equipment, components and associated hardware and updating of system data/maintenance records.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRRT27 Install overhead traction components and equipment

Competency Field

Rail Traction

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 maintenance of overhead traction equipment/components	**1.1** Work schedules, construction 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 the maintenance of overhead traction equipment/components 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained, understood and signed in accordance with workplace procedures

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	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 track protection officer and/or network control officer and workplace procedures
	1.9	Traffic management plan is confirmed as being applied in accordance with workplace procedures
	1.10	Environmental constraints applicable to work are identified and control measures applied
2 Perform maintenance of overhead traction equipment/components	**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	Systems and circuits are checked, isolated and proved safe to work on in accordance with workplace procedures
	2.4	Maintenance of overhead traction equipment/components are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.5	Electrical components/equipment and associated hardware are confirmed as operating within normal operating parameters and in accordance with workplace procedures
	2.6	Maintenance, including repair and/or replacement of overhead traction equipment/components, is in accordance with construction plans, drawings and workplace procedures
	2.7	Unplanned events are responded to in accordance with workplace procedures
	2.8	Quality checks of work, including visual inspections, are undertaken in accordance with workplace procedures

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3 Complete maintenance of overhead traction equipment/components	**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	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.3	Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.4	Relevant work permits are signed off after final inspections and the system is energised, tested and returned to service 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 UETTDRRT28A Maintain overhead traction components and 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 UETTDRRT28 Maintain overhead traction components and 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
- using at least two (2) of the following types of equipment:
  - fuse switches
  - dropout fuses
  - section insulators
  - switches/isolators
  - links
  - fuses
  - surge diverters
  - transformers
- using at least five (5) of the following types of components:
  - cantilever hardware
  - head span
  - neutral sections
  - pull offs
  - registration fittings
  - steady span
  - tension regulators
  - cross spans
  - tramway support network
  - pendulum
- using at least two (2) of the following types of fittings:
  - preformed fittings
  - compression fittings

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  - wedge fittings
  - bolted splices
- using at least three (3) of the following types of connecting components:
  - feeders
  - dissimilar conductors
  - lugs
  - bolted clamp
  - drapes/potential jumper
  - droppers
- obtaining equipment, tools and personal protective equipment (PPE) required for maintaining overhead traction components and equipment that includes at least two (2) of the following types of tools and equipment:
  - voltage detectors
  - micrometer/gauge
  - tension wrench
  - dynamometer
  - specialised tools
- 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:

- types and purpose of overhead traction equipment, including:
  - switches/isolators, fuse switches, links, section insulators, and fuses
- types and purpose of overhead components, including:
  - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators and cross spans
- types of conductors used for overheads wiring, such as hard-drawn, computer-aided drafting (CAD), and tin-bearing copper, aluminium, steel and other alloyed conductors
- types of traction wire support structures, such as portals, cantilevers, drop pieces, head spans, cross spans and pull-offs
- types and purpose of ancillary equipment, including:
  - surge arresters, booster and auxiliary transformers)
- methods for replacing conductors, including the use of:
  - preformed fittings
  - compression fittings
  - wedged fittings
  - bolted splices
  - lugs

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    - bolted clamps
- methods for replacing components, such as:
    - feeders
    - droppers
    - dissimilar conductors
    - jumpers
    - surge arresters
- use of plant and equipment for maintenance work, such as:
    - elevated work platforms (EWP)
    - ladders
    - works trains
    - rail-mounted overhead wiring equipment/vehicles
    - road/rail height access machinery/vehicles
    - voltage detectors
    - micrometer/gauges
    - tension wrenches
    - dynamometers
    - other specialised tools
- maintenance of overhead traction equipment and components, including:
    - types of equipment and components
    - types and function of tools and equipment
    - maintenance/repair procedures
    - inspection and recording procedures
- diagnosis and correction of simple faults in specific overhead traction equipment and component, including:
    - types and causes
    - determination of appropriate corrective actions
- repair and replace procedures for specific overhead traction equipment and 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 conditions involving realistic and authentic activities that replicate operational 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 PPE currently used in industry maintaining overhead traction components and equipment
- 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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UETTDRRT29 Operate rail road traction height access 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 operate rail road traction height access equipment in the electricity supply industry (ESI).

It includes operating and using road rail traction height access equipment to install and maintain overhead traction systems. It also includes performing pre-operational inspection, servicing of plant/equipment, undertaking safe working practices on or about the running line/track, isolation of systems and circuits for safe working in accordance with work plans and identifying and implementing traffic management plans.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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UETTDRRT21 Install traction overhead wiring systems

UETTDRRT22 Maintain traction overhead wiring systems

UETTDRRT27 Install overhead traction components and equipment

UETTDRRT28 Maintain overhead traction components and equipment

Competency Field

Rail Traction

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 operate road rail traction height access equipment	**1.1** Work schedules, construction 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 the operation of road rail traction height access equipment 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 identified, including emergency exists kept clear in accordance with workplace procedures
	1.6 Relevant work permits are obtained to access rail corridor and perform work in accordance with workplace procedures

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	1.7	Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8	Pre-operational inspection servicing of plant/equipment is performed in accordance with workplace procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with track protection officer and/or network control officer and workplace procedures
	1.10	Traffic management plan is confirmed as being applied in accordance with workplace procedures
	1.11	Environmental constraints applicable to work are identified and control measures applied
2 Carry out the operation of road rail traction height access equipment	**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	Operation of road rail traction height access equipment is completed in agreed timeframes, to quality standards and with a minimum of waste in accordance with workplace procedures
	2.4	Road rail traction height access equipment is operated in accordance with workplace procedures
	2.5	Unplanned events are responded to in accordance with workplace procedures
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete operation of road rail traction height access equipment	**3.1**	Post-operational checking and servicing of plant and equipment are performed for compliance and anomalies reported in accordance with workplace procedures
	3.2	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.3	Tools, equipment and surplus resources and materials

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are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures

3.4 Relevant work permits are signed off and the road rail traction height access equipment is returned 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 UETTDRRT29A Operate rail road traction height access 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 UETTDRRT29 Operate rail road traction height access 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
- completing all the following:
  - log books
  - work plan
- operating from at least one (1) of the following:
  - elevated work platform (EWP) in the performance of work associated with rail traction
  - road rail platform vehicle in the performance of work associated with rail traction
- 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:

- operator requirements, including:
  - pre-operational checks
  - recording procedures e.g. logbook
- road/rail traction height access equipment operation, including:
  - equipment characteristics, capabilities and limitations
  - prestart requirements
  - operation procedure
  - basic problem-solving equipment faults
  - safe working procedures when mechanical failure occurs
  - use of appropriate communication systems
  - permit to work systems and isolation procedures
- safe working and safety requirements when using road/rail traction height access equipment

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- procedures for effective traffic management
- electrical safety requirements prior to operating equipment under live overhead equipment and adjacent to or in the vicinity of live overhead equipment
- emergency procedures in the event of an electrical incident/accident
- emergency procedures in the event of a safe working/road traffic incident/accident
- WHS/OHS and Environment Protection Authority (EPA) requirements in the context of Commonwealth/state/territory legislative requirements
- Procedures for rescuing a person from height access equipment, including:
  - methods for rescuing a person
  - methods for rescuing a person from a disabled height access equipment
  - methods for rescuing an incapacitated person from a height access equipment
  - methods for rescuing a person in contact with live overhead 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 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 currently used in industry for operating rail road traction height access equipment
- 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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UETTDRRT30 Perform to a given schedule rail traction switching operations

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 to a given schedule rail traction switching operations in the electricity supply industry (ESI).

It includes operating circuit breaking and isolation devices associated with energy reticulation systems/networks and applying to rail systems in field situations. It also includes procedures for communicating with the switching control officer or electrical control officer, isolating electrical equipment and the line/network or worksite, proving the area is de-energised and earthed or rail-connected, issuing/accepting or holding of electrical permits and returning 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

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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

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UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRRT21 Install traction overhead wiring systems

UETTDRRT22 Maintain traction overhead wiring systems

UETTDRRT27 Install overhead traction components and equipment

UETTDRRT28 Maintain overhead traction components and equipment

Competency Field

Rail Traction

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 rail traction switching operations to a given schedule	**1.1** Work schedules, construction 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 rail traction switching operations to a given schedule 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained to access rail corridor and perform work in accordance with job

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		requirements and/or 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	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to perform work, as required
	1.9	Modifications to the scheduled which may be required after assessing the worksite is communicated to appropriate personnel for formal approval
	1.10	Worksite is prepared to minimise risk, damage to property, assets and individuals in accordance with track protection officer and/or network control officer and workplace procedures
	1.11	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.12	Traffic management plan is identified and implemented in accordance with workplace procedures
2 Carry out rail traction switching operations 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	Switching of rail traction operations are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4	Communications with switching control officer are established and maintained during isolation operation in accordance with workplace procedures
	2.5	Electrical equipment, associated circuits, line/network or worksite is isolated and proven de-energised using appropriate testing devices and earthed or rail connected, where required, in accordance with requirements and workplace procedures

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	2.6	Solutions used to solve problems are applied in accordance with workplace procedures
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete rail traction switching operations to a 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 removed, and the system made ready to be re-energised and returned to service in accordance with workplace procedures
	3.6	Work completion records, reports, as installed modified drawings, documentation and information are finalised, processed and relevant personnel and authorities 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 UETTDRRT30A Perform to a given schedule rail traction switching operations.

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Links

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Assessment Requirements for UETTDRRT30 Perform to a given schedule rail traction switching operations

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 of the following:
  - approvals/clearances
  - electrical/access permits
- using at least one (1) of the following types of testing equipment for performing overhead traction switching:
  - voltage detectors
  - field intensity meter
  - polarity testers
  - phase rotation indicators
- performing rail traction switching operations to given schedule which includes switching at least one (1) of the following types of switches for overhead traction switching:
  - high voltage (HV)/low voltage (LV) circuit breakers
  - HV/LV switches
  - HV/LV isolators
  - HV/LV links
  - HV/LV bridges
  - HV/LV fuses
- using all of the following:
  - portable earthing/rail-connecting equipment
  - operating rods/sticks
- 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:

- installation of overhead distribution conductors, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors - types of LV and HV overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; and minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and hardware
  - methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors, including:
  - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
  - requirements of persons prior to making bare hand contact with dead LV mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
  - safe working practices - requirements to enable safe working on conductive poles, procedure to attach an on-site earthing device to de-energised LV and HV overhead circuit
- 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, 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

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- 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 to a given schedule rail traction switching operations
- 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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UETTDRRT31 Maintain energised d.c. traction overhead wiring system

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 maintenance and repair of energised direct current (d.c.) traction overhead wiring system through the use of insulated ladder and working bare hand or insulated stick.

It includes the verification of the site conditions and the potential hazards, the conformance with and calculation of mechanical loads, the selection of appropriate tools and equipment, and authorised work method. It includes the undertaking of work health and safety (WHS)/occupational health and safety (OHS)and safe working practices to ensure that correct procedures and precautions to working live in accordance with the work plan and enterprise requirements are followed.

It also includes the visual inspection and necessary checks to confirm that overhead wiring components and associated hardware are in a safe condition to test and/or return to service, the recommissioning tests of the components and associated hardware and the updating of system data/maintenance records.

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

All competencies in one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

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

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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

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRIS65 Contribute to coordinated HV live working

UETTDRRT21 Install traction overhead wiring systems

UETTDRRT22 Maintain traction overhead wiring systems

UETTDRRT23 Install rail traction bonds

UETTDRRT25 Install overhead rail traction configurations

UETTDRRT26 Maintain overhead rail traction configurations

UETTDRRT27 Install overhead traction components and equipment

UETTDRRT28 Maintain overhead traction components and equipment

UETTDRRT29 Operate rail road traction height access equipment

UETTDRRT99 Test and verify rail traction installations

Competency Field

Rail Traction

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/plan to maintain energised d.c. traction	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site

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overhead wiring systems

inspection and the extent of the preparation of the work determined for planning and coordination

1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

1.3 Risk control measures are identified, prioritised and evaluated against the work schedule

1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

1.6 Relevant work authority/instructions are secured to coordinate the performance of work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures

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	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out maintenance of energised d.c. traction overhead wiring systems	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Maintenance of energised d.c. traction overhead wiring systems is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe maintenance of energised d.c. traction overhead wiring systems to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance	**3.1**	Work undertaken is checked against works schedule for

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of energised d.c. traction overhead wiring systems		conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work authorities/instructions are signed off or returned to client/customer in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRRT31A Maintain energised d.c. traction overhead wiring system.

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 UETTDRRT31 Maintain energised d.c. traction overhead wiring system

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, repairing or replacing components including at least two (2) of the following:
  - span
  - cross-span
  - headspan
  - section insulator
  - support equipment
  - tramway support network
- maintaining traction components including at least three (3) of the following:
  - catenary
  - dropper
  - contact/trolley
  - feeder/in-span feeder
  - drape/potential jumper
- performing at least two (2) of the following:
  - removal of trapped foreign objects
  - profiling
  - vertical adjustment of contact or trolley wire
- performing work from at least one (1) of the following:
  - insulated elevating work vehicles
  - insulated ladder
  - insulated work platforms
- using materials and equipment including at least two (2) of the following:
  - tensioning equipment

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- insulated sticks
- ropes
- slings and chains
- geometry profiling equipment

- 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:

- basic rigging techniques encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safe use of rigging equipment, tools and associated equipment - types, techniques and application
  - site inspection procedures - identifying hazards, assessing and controlling risks, and appropriate sequence of loading and unloading
  - determining the mass and dimensions of load
  - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan); ratings of wire ropes and slings; removing, repairing and replacing of damage parts
  - techniques for assembling and erecting power winches and capstans
  - checking the integrity of support structure -visual inspection of load connections
  - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, and load stability
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - construction types and structures for distribution and sub-transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and

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hardware
    - methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
    - limits of approach for personnel, vehicles, mobile plant and elevated work platforms (EWP)
    - requirements of persons prior to making bare hand contact with dead LV mains and apparatus
    - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
    - safe working practices - requirements to enable safe working on conductive poles, procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit
- safe working on energised LV equipment encompassing:
    - 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 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
- powerline safety practices encompassing:
    - 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 procedures 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, the procedure 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,

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establishing responses; developing techniques; involvement of external emergency services; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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
- LV switching principles encompassing:
  - 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 permits, operational procedures and earthing procedures
  - PPE for LV switching
- safe working on energised d.c. traction equipment encompassing:
  - Commonwealth/state/territory/local government legislation, standards, codes, supply authority regulations and/or enterprise requirements
  - safety precautions specific to working on energised LV d.c. traction overhead conductors and cables - safe approach distances (SAD); safe working practices, instructions and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of PPE; dangers of working in confined spaces and at heights; notification to work systems, safe working policies, procedures and practices when using/operating specialised equipment and tools; and emergency response and rescue, including first aid
  - techniques in installation, maintenance, replacing and repairing of energised d.c. traction overhead conductors, cables and equipment - span, cross-span, head-span, section insulator, support equipment, tramway support network, catenary, dropper, contact/trolley, feeder/in-span feeder and drape/potential jumper
  - techniques in carrying out work on energised d.c. traction overhead conductors, cables and equipment - removing trapped foreign objects, profiling and vertical adjustment of contact or trolley wire
  - techniques in using plant, equipment and/or tools to carry out work on energised d.c. traction overhead conductors, cables and equipment - insulated elevating work vehicles; insulated ladder; insulated work platforms; tensioning equipment; and insulated sticks, ropes, slings and chains
- enterprise-specific policies and procedure instructions encompassing:
  - 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

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  - 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 encompassing:
  - 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 drawings and documents encompassing:
  - 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRRT32 Maintain energised traction overhead electrical apparatus using stick techniques

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 maintenance and repair of energised traction overhead electrical apparatus via the use of approved live line insulated stick techniques.

It includes the verification of site conditions and the potential hazards, the conformance with and calculation of physical loads, the selection of appropriate tools and equipment, and authorised work methods. It encompasses the undertaking of correct procedures and precautions to working live line in accordance with the work plan and enterprise requirements.

It also includes the visual inspection and necessary checks to confirm that the electrical apparatus and components are in a safe condition to test and/or return to service, and the recommissioning tests of the electrical apparatus and components.

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

All competencies in one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

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

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UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRIS65 Contribute to coordinated HV live working

UETTDRRT21 Install traction overhead wiring systems

UETTDRRT22 Maintain traction overhead wiring systems

UETTDRRT23 Install rail traction bonds

UETTDRRT25 Install overhead rail traction configurations

UETTDRRT26 Maintain overhead rail traction configurations

UETTDRRT27 Install overhead traction components and equipment

UETTDRRT28 Maintain overhead traction components and equipment

UETTDRRT29 Operate rail road traction height access equipment

UETTDRRT31 Maintain energised d.c. traction overhead wiring system

UETTDRRT99 Test and verify rail traction installations

Competency Field

Rail Traction

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/plan to maintain energised traction overhead electrical apparatus	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work

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determined for planning and coordination

1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

1.3 Calculation of physical loads and authorised work methods are obtained and relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.4 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

1.5 Hazards associated with the work are identified and risk control measures implemented, including the rendering inoperative of automatic reclosing device

1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR), pole top and other rescue procedures according to requirements

1.9 Liaison and communication issues with others/ authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised,

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		where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the maintenance of energised traction overhead electrical apparatus	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, CPR, pole top, other rescue procedures and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, and working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Auto-reclose devices associated with the circuits being worked on are rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements
	2.5	Essential knowledge and associated skills are applied in the safe maintenance of energised traction overhead electrical apparatus to ensure completion within an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.7	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.8	Unplanned events in the maintenance of energised traction overhead electrical apparatus are managed within the scope of established procedures
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry

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		standard
3 Complete the maintenance of energised traction overhead electrical apparatus	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work documentation is signed off and traction overhead electrical apparatus returned to service, including returning of auto-reclosing device to normal, and client/customer advised in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRRT32A Maintain energised traction overhead electrical apparatus using stick techniques.

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Links

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Assessment Requirements for UETTDRRT32 Maintain energised traction overhead electrical apparatus using stick techniques

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, repairing or replacing components including at least two (2) of the following:
  - support structures
  - span
  - section insulator
  - neutral section
  - midpoint anchor
  - support equipment
  - tension regulators
- maintaining traction components including at least two (2) of the following:
  - catenary
  - dropper
  - contact feeder
- performing at least one (1) of the following:
  - insulated elevated work platform (EWP)
  - insulated ladder
  - insulated mobile platform
- performing work from at least two (2) of the following:
  - specialised insulated tools
  - insulated sticks
  - tensioning equipment
  - geometry profiling equipment
- using materials and equipment including at least two (2) of the following:
  - air-break switches

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- insulators
- surge arrestors
- hardware and fittings

- 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:

- basic rigging techniques encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safe use of rigging equipment, tools and associated equipment - types, techniques and application
  - site inspection procedures - identifying hazards, assessing and controlling risks, and appropriate sequence of loading and unloading
  - determining the mass and dimensions of load
  - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan); ratings of wire ropes and slings; removing, repairing and replacing damaged parts
  - techniques for assembling and erecting power winches and capstans
  - checking the integrity of support structure - visual inspection of load connections
  - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods, codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements, weather conditions, erection of safety nets and lines, methods of fixing and anchoring loads, and load stability
- installation of overhead distribution conductors encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing conductors and associated equipment
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings - material lists, conductor size, type and route length
  - constructions types and structures for distribution and sub-transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing and maintenance of conductors - types of low voltage (LV) and high voltage (HV) overhead electrical conductor connections; causes and effects of poor electrical connections; reasons for and methods used to maintain standard phase sequencing; removing, repairing and replacing damaged conductors; minimum clearances between overhead conductors and LV and HV structures
  - techniques for conductor installation - types and application of tools, equipment and hardware

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    - methods of stringing, tensioning and termination of LV and HV conductors
- safe working practices and procedures for the installation of overhead distribution conductors encompassing:
    - limits of approach for personnel, vehicles, mobile plant and EWP
    - requirements of persons prior to making bare hand contact with dead LV mains and apparatus
    - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
    - safe working practices - requirements to enable safe working on conductive poles, procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit
- safe working on energised LV equipment encompassing:
    - 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 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, release and rescue procedures for work on or near exposed energised LV conductors
- powerline safety practices encompassing:
    - 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, 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, and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock

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victim, including cardiopulmonary 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
- LV switching principles encompassing:
    - 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 permits, operational procedures and earthing procedures
    - PPE for LV switching
- safe working on energised direct current (d.c.) traction equipment encompassing:
    - Commonwealth/state/territory/local government legislation, standards, codes, supply authority regulations and/or enterprise requirements
    - safety precautions specific to working on energised LV d.c. traction overhead conductors and cables - safe approach distances (SAD); safe working practices, instructions and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of PPE; dangers of working in confined spaces and at heights; notification to work systems; safe working policies, procedures and practices when using/operating specialised equipment and tools; and emergency response and rescue, including first aid
    - techniques in installation, maintenance, replacing and repairing of energised d.c. traction overhead conductors, cables and equipment - span, cross-span, head-span, section insulator, support equipment, tramway support network, catenary, dropper, contact/trolley, feeder/in-span feeder and drape/potential jumper
    - techniques in carrying out work on energised d.c. traction overhead conductors, cables and equipment - removing trapped foreign objects, profiling and vertical adjustment of contact or trolley wire
    - techniques in using plant, equipment and/or tools to carry out work on energised d.c. traction overhead conductors, cables and equipment - insulated elevating work vehicles; insulated ladders; insulated work platforms; tensioning equipment; and insulated sticks, ropes, slings and chains
- enterprise-specific policies and procedure instructions encompassing:
    - 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

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  - 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 encompassing:
  - 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 drawings and documents encompassing:
  - 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRRT33 Maintain energised traction overhead electrical apparatus using glove techniques

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 maintenance and repair of energised traction overhead electrical apparatus via the use of approved live line glove and barrier techniques.

It includes the verification of site conditions and the potential hazards, the conformance with and calculation of physical loads, the selection of appropriate tools and equipment, and authorised work methods. It encompasses the undertaking of correct procedures and precautions to working live line in accordance with the work plan and enterprise requirements.

It also includes the visual inspection and necessary checks to confirm that the electrical apparatus and components are in a safe condition to test and/or return to service, and the recommissioning tests of the electrical apparatus and components.

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

All competencies in one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Rail Traction Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

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

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UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRIS65 Contribute to coordinated HV live working

UETTDRRT21 Install traction overhead wiring systems

UETTDRRT22 Maintain traction overhead wiring systems

UETTDRRT23 Install rail traction bonds

UETTDRRT25 Install overhead rail traction configurations

UETTDRRT26 Maintain overhead rail traction configurations

UETTDRRT27 Install overhead traction components and equipment

UETTDRRT28 Maintain overhead traction components and equipment

UETTDRRT29 Operate rail road traction height access equipment

UETTDRRT31 Maintain energised d.c. traction overhead wiring system

UETTDRRT99 Test and verify rail traction installations

Competency Field

Rail Traction

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/plan to maintain energised traction overhead electrical apparatus (glove)	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work

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determined for planning and coordination

1.2 Calculation of physical loads and authorised work methods are obtained and relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures

1.4 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

1.5 Hazards associated with the work are identified and risk control measures implemented, including the rendering inoperative of automatic reclosing device

1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order

1.8 Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR), pole top and other rescue procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised,

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		where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the maintenance of energised traction overhead electrical apparatus (glove)	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, CPR, pole top, other rescue procedures and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, and working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Auto-reclose devices associated with the circuits being worked on are rendered inoperative and necessary work documentation acquired in accordance with enterprise requirements
	2.5	Essential knowledge and associated skills are applied in the safe maintenance of energised traction overhead electrical apparatus to ensure completion within an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.7	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.8	Solutions to non-routine problems are identified and actioned in the maintenance of energised traction overhead electrical apparatus using acquired essential knowledge and associated skills according to requirements and established procedures
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established

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		procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance of energised traction overhead electrical apparatus (glove)	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work documentation is signed off and traction overhead electrical apparatus returned to service, including returning of auto-reclosing device to normal, and client/customer advised in accordance with requirements
	3.6	Work completion records, reports, as installed//modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRRT33A Maintain energised traction overhead electrical apparatus using glove techniques.

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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 UETTDRRT33 Maintain energised traction overhead electrical apparatus using glove techniques

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
- operating from at least one (1) of the following:
  - elevated work platform (EWP)
  - insulated ladder
  - insulated mobile platform
- using at least two (2) of the following:
  - specialised tools
  - insulated gloves and barriers
  - tensioning equipment
  - geometry profiling equipment
- using at least two (2) of the following:
  - air-break switches
  - insulators
  - surge arrestors
  - hardware and fittings
- 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:

- working on energised lines to 33 kV using live line glove and barrier techniques encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on energised lines to 33 kV

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(poles) using live line glove and barrier techniques

- safety precautions working on energised lines to 33 kV using live line high voltage (HV) rubber gloving techniques - live line minimum approach distances of persons and plant; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); live line access authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement; types and function of specialised live line working equipment and tools inspection before use; safe working policies, procedures and practices when using/operating specialised equipment and tools; methods of using specialised equipment and tools; work team communication; use of safety observers; and emergency response and rescue, including first aid
- policies and procedures dealing with general work practices - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, types of equipment and their compliance with relevant standards
- relationship between combined glove and barrier and stick methods - conditions under which they can be practiced
- techniques in installing and/or replacing HV insulators when working live line glove and barrier - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators
- techniques in erecting and/or replacing HV cross-arms when working live line glove and barrier - intermediate, angle, strain, termination and suspension
- techniques in connecting and/or disconnecting HV bridges connections when working live line glove and barrier - strain/Tee bridges, bypass bridges/connections, HV ABC and similar/dissimilar metals
- techniques in the installation and/or maintenance of electrical equipment - air-break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators
- techniques in erecting and/or removing temporary midspan switching devices
- techniques using live line glove and barrier to erect and/or replace of poles - intermediate, angle and strain
- techniques using live line glove and barrier for the repair and/or replacement of HV conductors/cables
- techniques in repairing and/or replacing HV armour rods and/or line guards
- conversion methods using live line glove and barrier of intermediate construction to strain construction

- working on energised lines to 33 kV (poles) using live line glove and barrier/hot-stick combined encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on energised lines to 33 kV (poles) using live line glove and barrier/hot-stick combined
  - safety precautions working on energised lines to 33 kV using live line glove and barrier/hot-stick combined - live line minimum approach distances of persons and plant; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; live line access

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authority/permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement ;types and function of specialised live line working equipment and tools inspection before use; safe working policies, procedures and practices when using/operating specialised equipment and tools; methods of using specialised equipment; work team communication; use of safety observers; and emergency response and rescue, including first aid

- policies and procedures dealing with general work practices for both glove and barrier/hot-stick combined, - definitions of terms used, responsibilities of personnel, types of structures from which glove and barrier methods can be performed, and types of equipment and their compliance with relevant standards
- relationship between combined glove and barrier/ hot-stick methods - conditions under which they can be practiced
- techniques for installing and/or replacing HV insulators using glove and barrier/hot-stick combined - intermediate insulators, angle insulators, bridging insulators, strain insulators and suspension insulators
- techniques for erecting and/or replacing HV cross-arms using glove and barrier/hot-stick combined - intermediate and angle
- techniques for connecting and/or disconnecting HV bridges connections using glove and barrier/hot-stick combined - strain/Tee bridges, bypass bridges/connections, HV ABC and HV and similar/dissimilar metals
- techniques in the installation and/or maintenance of electrical equipment using hot-stick - air-break switches, gas switches, fuse assemblies, isolators, bird covers, surge diverters and fault indicators
- techniques in the erection and/or replacement of poles - intermediate/suspension, angle, strain and termination
- techniques in repairing and/or replacing HV armour rods and/or line guards and/or conversion methods of intermediate construction to strain in construction
- techniques in the repairing and replacing HV conductors/cables and the identification of equipment used
- techniques in installing and/or maintaining switching devices using glove and barrier

- plant, equipment and tools used for HV live line work encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with plant, equipment and tools used for HV live line work
  - safety precautions when working on plant, equipment and tools using hot-stick combined - safe working clearances; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses (PPE) and authorisation to work systems
  - identification of plant, equipment and tools used for HV live line work – types, applications, construction, characteristics, limitations and safe working load
  - serviceability of plant, equipment and tools used for HV live line work - inspection procedures, testing procedures, maintenance procedures and storage procedures
  - relationship of live line work access authority/permit, disabling auto-reclose function and

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ensuring correct functioning of fault current protective devices prior to live line work
  - live line access authorities, disabling auto-reclose function and ensuring fault current protective devices prior to live line work
  - conductor supports – methods, types of equipment, construction, characteristics and limitations
  - techniques in selecting appropriate conductor support methods in accordance with requirements
  - calculation of loads and wind loading on conductors
  - effects of resultant forces when transferring conductor loads
  - rigging procedures for conductor support equipment
- principles of HV encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on or near HV
  - electrical and electrostatic principles related to HV lines - relationship of current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages
  - production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential
  - HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, and performance of a failed disc insulator on the line and the system
  - determining the minimum allowable number of discs per string for each line voltage in the system before bare hand work is to proceed
  - techniques in detecting a failed disc in a string
  - techniques in using appropriate tools and equipment to test a string
  - methods of recording data
  - effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, and effects of electrostatic induction on bare hand work
  - application of Faraday’s cage - effects of a body, advantages, and description of the Faraday’s cage used by bare-hand live-line workers
  - safety precautions working on or near HV electrical apparatus - safe approach distances (SAD) from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE, permit to work systems and isolation procedures
  - types and function of specialised live working equipment
  - safe working policies, procedures and practices when using and operating specialised equipment
  - methods of using specialised equipment
  - emergency response and rescue, including first aid
  - effects of lighting and switching surges on performance of string insulators - health effects to workers

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  - methods used to alleviate surges on transmission lines
  - magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields
- HV switching principles encompassing:
  - 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 procedures for operational forms, 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 effectiveness of operational earthing, acceptable industry procedures, PPE and high voltage 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 encompassing:
  - 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 encompassing:
  - 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

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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 encompassing:
    - application and function of SWER system components
    - circuit arrangement
    - principle of operation
    - hazards and procedures associated with faulty SWER earth systems
    - procedure to isolate, energise and commission SWER substations
- feeder automation system encompassing:
    - 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 voice annunciated system and local control station
- safe working on energised HV alternating current (a.c.) and/or direct current (d.c.) traction equipment encompassing:
    - Commonwealth/state/territory/local government legislation, standards, codes, supply authority regulations and/or enterprise requirements
    - safety precautions specific to working on energised LV d.c. traction overhead conductors and cables - live line minimum approach distances; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of PPE; live line permit system; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement; types and function of specialised live line working equipment and tools inspection before use; safe working practices when using specialised equipment and tools; methods of using specialised equipment; work team communication; use of safety observers; and emergency response and rescue, including first aid
    - techniques in the use of hot-sticks for the maintenance of energised traction overhead apparatus
    - techniques in the use of glove and barrier on energised traction overhead apparatus.

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, 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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UETTDRRT34 Install and maintain traction network wiring 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 the installation and maintenance of overhead traction wiring systems to ensure proper installation, in particular, the correct registration of the contact wire with respect to the current collectors.

It includes the undertaking of safe working practices on or about the running line/track and the preparation needed for stringing and profiling, including the isolation of systems and circuits for safe working according to work plans, the diagnosis of faults and the modification and re-adjustment to appropriate standards.

It also encompasses the correct positioning of road signs, barriers and/or warning devices, and the procedure of issuing/accepting electrical permits. It also includes the visual and other necessary checks to confirm that equipment and associated hardware have been correctly installed according to design and are in a safe condition to undertake pre-commissioning tests prior to putting into service and updating installation and maintenance data, such as as-built drawings and relevant quality assurance 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

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

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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

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Rail Traction

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/plan to install and maintain traction network wiring systems	**1.1**	Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3	Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and maintenance of traction network wiring systems are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures are prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8	Relevant personnel at worksite are confirmed current in cardiopulmonary resuscitation (CPR), first aid, other rescue procedures and related work procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant

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		operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures
	1.12	Rail/road signs, barriers and warning devices are positioned in accordance with requirements
	1.13	Environmental constraints applicable to work are identified and control measures applied
2 Carry out the installation and maintenance of traction network wiring systems	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.3	Systems and circuits are isolated, as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of traction network wiring systems to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Overhead traction wiring systems, including cables, fittings, traction conductors and associated equipment, are installed according to design, work schedule requirements and established procedures
	2.6	Maintenance, including repair and/or replacement of overhead traction wiring systems, including the modification and re-adjustment of overhead traction conductors is carried out in accordance with the work schedule and requirements/established procedures
	2.7	Profiling is completed according to established procedures
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures

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	2.9 Unplanned events in the installation and maintenance of traction network wiring systems are undertaken within the scope of established procedures
	2.10 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of traction network wiring systems	**3.1** Work undertaken is checked against design drawings and work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5 Relevant work permits are signed off and the overhead traction network wiring system is returned to service in accordance with requirements
	3.6 Works completion records, reports, as installed/modified drawings and/or documentation and information are finalised and processed and appropriate 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT34A Install and maintain traction network wiring 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 UETTDRRT34 Install and maintain traction network wiring 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
- installing and maintaining at least four (4) of the following:
  - support structure
  - span
  - section insulator
  - neutral section
  - midpoint anchor
  - support equipment
  - tension regulators
  - stay/guy wire
  - tramway support network
- installations must incorporate at least two (2) of the following:
  - catenary
  - dropper
  - contact/trolley*
  - feeder
  - earth conductor
  - drape/potential jumper
  - (*must do)
- performing work from at least one (1) of the following:
  - elevated work platform (EWP)
  - ladder
  - mobile platform
- installations must also incorporate at least two (2) of the following:

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  - tensioning equipment*
  - specialised tools
  - ropes
  - geometry profiling equipment
  - (*must do)
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to the electrical traction
- electrical traction voltage and current circuit paths encompassing:
  - transmission distribution voltages
  - traction supply system and voltages
  - return and stay current paths, including electrolysis
- relationship of sectioning, section insulator and overlaps/air gaps in a traction power system
- traction power system components encompassing:
  - function of transformer/rectifiers
  - configuration and purpose of traction overhead wiring systems
  - function of isolators/switches
  - function of the circuit breaker
- reliability and security of traction supply
- traction power system electrical protection encompassing:
  - load protection
  - surge protection
  - fault protection
  - electrolytic protection
- impact of electromagnetic forces encompassing:
  - telephone interference
  - effects of television/radio interference
- insulation methods in a traction power system encompassing:
  - types of electrical insulation
  - insulation coordination
  - reason for electrical clearances
- bonding systems - structure bonds, traction bonds/bonding cables and impedance bonds
- ancillary conductors - feeder wires, current return path and other ancillary conductors
- relationship of current and potential drapers/jumpers to the traction power system
- electrical wiring system components - earth wires, feeder wire, return conductor, insulators,

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catenary wire, contact/trolley wire, droppers, tensioning equipment, current collectors, tram support networks, tram fittings and bridge/tunnel fittings
- electrical traction circuits encompassing:
  - types
  - applications
- relationship of the components, apparatus and the conductors to the operation of the traction system
- effective current collection and wire interface
- effective registration in the traction power system
- profiling overhead traction wire methods
  - factors that impact on current collectors
  - methods to achieving smooth current collector transitions and interfaces
- dynamic and static forces encompassing:
  - types that effect traction systems
  - effects on effective registration
  - techniques to minimise the adverse effects.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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

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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UETTDRRT35 Install and maintain traction network equipment and components

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 installation and maintenance of the overhead traction electrical equipment and components as well as associated hardware, including ancillary equipment.

It includes the repair or replacement of like-for-like electrical components/equipment and associated hardware and the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and/or warning devices and the procedure of issuing/accepting electrical permits.

It also includes the visual inspection and necessary checks to confirm that equipment, components and associated hardware have been correctly installed according to design and are in a safe condition to test prior to putting to service, the undertaking of pre-commissioning tests as required to ensure the integrity of the traction system prior to putting back into service and the updating of installation data and relevant quality assurance 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

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

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UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRRT34 Install and maintain traction network wiring systems

Competency Field

Rail Traction

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 for the installation and maintenance of traction network equipment/components	**1.1**	Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3	Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and maintenance of overhead traction equipment/components are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8	Relevant personnel at worksite are confirmed current in cardiopulmonary resuscitation (CPR), first aid, and other rescue procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant

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		operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures
	1.12	Rail/road signs, barriers and warning devices are positioned in accordance with requirements
	1.13	Environmental constraints applicable to work are identified and control measures applied
2 Carry out the installation and maintenance of traction network equipment/components	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe installation of overhead traction equipment/components to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Electrical components/equipment and associated hardware are positioned, secured and terminated/connected in accordance with requirements and established procedures
	2.6	Electrical component/equipment and associated hardware is ascertained as operating within normal operating parameters and in accordance with requirements and established procedures
	2.7	Maintenance, including repair and/or replacement of overhead traction equipment/components, is carried out in accordance with the work schedule and requirements/established procedures
	2.8	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according

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		to established procedures
	2.9	Unplanned events during the installation of overhead traction equipment/components are responded to within the scope of established procedures
	2.10	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.11	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of traction network equipment/components	**3.1**	Work undertaken is checked against design drawings and work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.3	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.4	Relevant work permits are signed off after final inspections and the system is energised, tested and returned to service in accordance with requirements
	3.5	Work completion records, reports, as installed//modified drawings and/or documentation and information are finalised and processed and appropriate 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRRT35A Install and maintain traction network equipment and components.

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 UETTDRRT35 Install and maintain traction network equipment and components

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
- installing and maintaining traction network equipment and components incorporating at least two (2) of the following:
  - fuse switches
  - dropout fuses
  - section insulators
  - switches/isolators
  - links
  - fuses
  - surge diverters
  - transformers
- installing and maintaining traction network equipment and components must incorporate at least five (5) of the following:
  - cantilever hardware
  - head span
  - neutral sections
  - pull offs
  - registration fittings
  - steady span
  - tension regulators
  - cross spans
  - tramway support network
  - pendulum
- incorporating at least two (2) of the following:
  - preformed fittings

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  - compression fittings
  - wedge fittings
  - bolted splices
- incorporating at least three (3) of the following:
  - feeders
  - dissimilar conductors
  - lugs
  - bolted clamp
  - drapes/potential jumper
  - droppers
- incorporating at least two (2) of the following:
  - voltage detectors
  - micrometer/gauge
  - tension wrench
  - dynamometer
  - specialised tools
- 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:

- overhead traction equipment encompassing:
  - types - switches/isolators, fuse switches, links, section insulators and fuses
  - purpose
- types of overhead traction components encompassing:
  - types - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators and cross spans
  - purposes
- types of conductors used for overhead wiring encompassing:
  - hard-drawn; computer-aided drafting (CAD); and tin-bearing copper, aluminium, steel and other alloyed conductors
- types of traction wire support structures that may consist of portals, cantilevers, drop pieces, head spans, cross spans and pull-offs
- ancillary equipment encompassing:
  - types - surge arresters, booster and auxiliary transformers
  - purpose
- methods for installing/replacing conductors encompassing:
  - preformed fittings

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  - compression fittings
  - wedged fittings
  - bolted splices
  - lugs
  - bolted clamps
- methods for installing/replacing components encompassing:
  - feeders
  - droppers
  - dissimilar conductors
  - jumpers
  - surge arresters
- use of plant and equipment for installation/maintenance work encompassing:
  - elevated work platforms (EWP)
  - ladders
  - works trains
  - rail-mounted overhead wiring equipment/vehicles
  - road/rail height access machinery/vehicles
  - voltage detectors
  - micrometer/gauges
  - tension wrenches
  - dynamometers
  - other specialised 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 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, 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

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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UETTDRRT36 Maintain traction network wiring 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 the maintenance of overhead traction wiring systems to ensure their proper operation, in particular, the correct registration of the contact wire with respect to the current collectors.

It includes the undertaking of safe working practices on or about the running line/track and the preparation needed for stringing and profiling, including the isolation of systems and circuits for safe working according to work plans, the diagnosis of faults and the modification and re-adjustment to appropriate standards.

It also encompasses the correct positioning of road signs, barriers and/or warning devices, and the procedure of issuing/accepting electrical permits. It also includes the visual and other necessary checks to confirm that equipment and associated hardware have been correctly maintained according to design and are in a safe condition to undertake tests prior to putting into service, and updating of maintenance data, such as as-built drawings and relevant quality assurance 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

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

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circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Rail Traction

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/plan to maintain traction network wiring systems	**1.1** Work schedule(s), including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to

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		requirements and established procedures for the maintenance of traction network wiring systems are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified; WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8	Relevant personnel at worksite are confirmed current in cardiopulmonary resuscitation (CPR), first aid, other rescue procedures and related work procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures
	1.12	Rail/road signs, barriers and warning devices are positioned in accordance with requirements
	1.13	Environmental constraints applicable to work are identified and control measures applied
2 Carry out the maintenance of traction	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in

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network wiring systems		accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe maintenance of traction network wiring systems to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Maintenance, including repair and/or replacement of overhead traction wiring systems, including the modification and re-adjustment of overhead traction conductors is carried out in accordance with the work schedule and requirements/established procedures
	2.6	Profiling is completed according to established procedures
	2.7	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.8	Unplanned events in the maintenance of traction network wiring systems are undertaken within the scope of established procedures
	2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the maintenance of traction network wiring systems	**3.1**	Work undertaken is checked against design drawings and work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where

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applicable

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and the overhead traction network wiring system is returned to service in accordance with requirements

3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are finalised and processed and appropriate 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 UETTDRRT36A Maintain traction network wiring 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 UETTDRRT36 Maintain traction network wiring 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
- maintaining associated conductor equipment including at least four (4) of the following:
  - support structure
  - span
  - section insulator
  - neutral section
  - midpoint anchor
  - support equipment
  - tension regulators
  - stay/guy wire
  - tramway support network
- maintaining conductor and support wires including at least two (2) of the following:
  - catenary
  - dropper
  - contact/trolley*
  - feeder
  - earth conductor
  - drape/potential jumper
  - (*must do)
- performing work from at least one (1) of the following:
  - elevated work platform (EWP)
  - ladder
  - mobile platform
- using tools and equipment including at least two (2) of the following:

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  - tensioning equipment*
  - specialised tools
  - ropes
  - geometry profiling equipment
  - (*must do)
- 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:

- standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to the electrical traction
- electrical traction voltage and current circuit paths encompassing:
  - transmission distribution voltages
  - traction supply system and voltages
  - return and stay current paths, including electrolysis
- relationship of sectioning, section insulator and overlaps/air gaps in a traction power system
- traction power system components encompassing:
  - function of transformer/rectifiers
  - configuration and purpose of traction overhead wiring systems
  - function of isolators/switches
  - function of the circuit breaker
  - reliability and security of traction supply
- traction power system electrical protection encompassing:
  - load protection
  - surge protection
  - fault protection
  - electrolytic protection
- impact of electromagnetic forces encompassing:
  - telephone interference
  - effects of television/radio interference
- insulation methods in a traction power system encompassing:
  - types of electrical insulation
  - insulation coordination
  - reason for electrical clearances
- bonding systems - structure bonds, traction bonds/bonding cables and impedance bonds
- ancillary conductors - feeder wires, current return path and other ancillary conductors
- relationship of current and potential drapers/jumpers to the traction power system
- methods to achieving smooth current collector transitions and interfaces

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- dynamic and static forces encompassing:
  - types that effect traction systems
  - effects on effective registration
  - techniques to minimise the adverse effects
- overhead traction equipment encompassing:
  - types - switches/isolators, fuse switches, links, section insulators and fuses
  - purpose
- types of overhead traction components encompassing:
  - types - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators and cross spans
  - purposes
- types of conductors used for overhead wiring encompassing:
  - hard-drawn; computer-aided drafting (CAD); and tin-bearing copper, aluminium, steel and other alloyed conductors
- types of traction wire support structures encompassing:
  - portals, cantilevers, drop pieces, head spans, cross spans and pull-offs
- ancillary equipment encompassing:
  - types - surge arresters, booster and auxiliary transformers
  - purpose
- methods for replacing conductors encompassing:
  - preformed fittings
  - compression fittings
  - wedged fittings
  - bolted splices
  - lugs
  - bolted clamps
- methods for replacing components encompassing:
  - feeders
  - droppers
  - dissimilar conductors
  - jumpers
  - surge arresters
- use of plant and equipment for maintenance work encompassing:
  - EWP
  - ladders
  - works trains
  - rail-mounted overhead wiring equipment/vehicles
  - road/rail height access machinery/vehicles
  - voltage detectors

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- micrometer/gauges
- tension wrenches
- dynamometers
- other specialised 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 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, 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

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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UETTDRRT37 Maintain traction network equipment and components

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 maintenance of overhead traction electrical equipment and components as well as associated hardware, including ancillary equipment.

It includes the repair or replacement of like-for-like electrical components/equipment and associated hardware and the undertaking of safe working practices on or about the running line/track. It also encompasses the isolation of systems and circuits for safe working according to work plans and the correct positioning of road signs, barriers and/or warning devices and the procedure of issuing/accepting electrical permits.

It also includes the visual inspection and necessary checks to confirm that equipment, components and associated hardware are in a safe condition to test prior to putting to service, the undertaking of tests as required to ensure the integrity of the traction system prior to putting back into service, and the updating of maintenance data and relevant quality assurance 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

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

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circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRRT36 Maintain traction network wiring systems

Competency Field

Rail Traction

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 the maintenance of traction network equipment and components	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

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1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the maintenance of overhead traction equipment/components are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel

1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures

1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order

1.8 Relevant personnel at worksite are confirmed current in cardiopulmonary resuscitation (CPR), first aid and other rescue procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed where applicable in accordance with established procedures

1.12 Rail/road signs, barriers and warning devices are positioned in accordance with requirements

1.13 Environmental constraints applicable to work are identified and control measures applied

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2	**Carry out the maintenance of traction network equipment and components**	**2.1** WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
		2.2 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
		2.3 Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
		2.4 Essential knowledge and associated skills are applied in the safe maintenance of overhead traction equipment/components to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
		2.5 Maintenance, including repair and/or replacement of overhead traction equipment/components, is carried out in accordance with the work schedule and requirements/established procedures
		2.6 Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
		2.7 Unplanned events during the maintenance of overhead traction equipment/components are undertaken within the scope of established procedures
		2.8 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
		2.9 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3	**Complete the maintenance of traction network equipment and components**	**3.1** Work undertaken is checked against design drawings and works schedule for conformance with requirements and anomalies reported in accordance with established procedures
		3.2 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

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3.3 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.4 Relevant work permits are signed off after final inspections and the system is energised, tested and returned to service in accordance with requirements

3.5 Work completion records, reports, modified drawing and/or documentation and information are finalised and processed and appropriate 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 UETTDRRT37A Maintain traction network equipment and components.

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 UETTDRRT37 Maintain traction network equipment and components

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 ancillary equipment including at least two (2) of the following:
  - fuse switches
  - dropout fuses
  - section insulators
  - switches/isolators
  - links
  - fuses
  - surge diverters
  - transformers
- maintaining traction wire support structures including at least five (5) of the following:
  - cantilever hardware
  - head span
  - neutral sections
  - pull offs
  - registration fittings
  - steady span
  - tension regulators
  - cross spans
  - tramway support network
  - pendulum
- using termination materials including at least two (2) of the following:
  - preformed fittings
  - compression fittings

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  - wedge fittings
  - bolted splices
- using traction system components including at least three (3) of the following:
  - feeders
  - dissimilar conductors
  - lugs
  - bolted clamp
  - drapes/potential jumper
  - droppers
- using tools and equipment including at least two (2) of the following:
  - voltage detectors
  - micrometer/gauge
  - tension wrench
  - dynamometer
  - specialised tools
- 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:

- overhead traction equipment encompassing:
  - types - switches/isolators, fuse switches, links, section insulators and fuses
  - purpose
- types of overhead traction components encompassing:
  - types - cantilever hardware, droppers, bay components, portal hardware, head span hardware, section insulators, neutral sections, registration fittings, steady span, tension regulators and cross spans
  - purposes
- types of conductors used for overhead wiring encompassing:
  - hard-drawn; computer-aided drafting (CAD); and tin-bearing copper, aluminium, steel and other alloyed conductors
- types of traction wire support structures encompassing:
  - portals, cantilevers, drop pieces, head spans, cross spans and pull-offs
- ancillary equipment encompassing:
  - types - surge arresters, booster and auxiliary transformers
  - purpose
- methods for replacing conductors encompassing:
  - preformed fittings
  - compression fittings

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  - wedged fittings
  - bolted splices
  - lugs
  - bolted clamps
- methods for replacing components encompassing:
  - feeders
  - droppers
  - dissimilar conductors
  - jumpers
  - surge arresters
- use of plant and equipment for maintenance work encompassing:
  - elevated work platforms (EWP)
  - ladders
  - works trains
  - rail-mounted overhead wiring equipment/vehicles
  - road/rail height access machinery/vehicles
  - voltage detectors
  - micrometer/gauges
  - tension wrenches
  - dynamometers
  - other specialised 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 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, 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

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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UETTDRRT99 Test and verify rail traction installations

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 test and verify rail traction installations in the electricity supply industry (ESI).

It includes inspecting, testing and verifying rail traction installations are safe and comply with all requirements. It also includes working safely, carrying out visual inspections and mandatory, optional and functional test procedures, identifying non-compliance defects and mandatory reporting requirements.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical 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

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UETTDRRT22 Maintain traction overhead wiring systems

UETTDRRT27 Install overhead traction components and equipment

UETTDRRT28 Maintain overhead traction components and equipment

Competency Field

Rail Traction

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 inspect, test and verify rail traction installations	**1.1** Work schedules, construction 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 accessing, testing and verification of rail traction installations 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are obtained to access rail corridor, understood and signed in accordance with workplace procedures

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	1.7 Plant, equipment, tools and personal protective equipment (PPE) required for work are identified, obtained and confirmed in working order
	1.8 Specialist test and measurement equipment for testing and verification of rail traction installations are obtained, inspected, calibrated and confirmed in working order in accordance with workplace procedures
	1.9 Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with track protection officer and/or network control officer and workplace procedures
	1.10 Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Carry out visual inspection, test and verification of Rail Traction installation	**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 Testing and verification of rail traction installations are completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4 Rail traction installations and associated hardware are visually inspected and confirmed as positioned, secured and terminated/connected in accordance with job requirements and workplace procedures
	2.5 Energised tests and/or measurements, as required, to verify rail traction installations are determined in accordance with WHS/OHS requirements and conducted within workplace safety procedures
	2.6 Rail traction installations are checked for suitability and compliance with organisational construction standards and relevant electrical rail traction network supply standards
	2.7 Rail traction installation protection methods and devices are validated as meeting organisational construction and relevant rail traction network protection standards

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	2.8	Rail traction installation switchgear is appropriately rated and validated, meeting functional requirements of organisational construction and relevant distribution network protection standards
	2.9	Rail traction installations earthing system and multiple earth neutral (MEN) system components are installed and compliance verified in accordance with workplace construction procedures and distribution network standards
	2.10	Mandatory tests are conducted to verify rail traction installation is in accordance with workplace procedures
	2.11	Solutions used to solve problems are applied in accordance with workplace procedures
	2.12	Quality checks of work are undertaken in accordance with workplace procedures
3 Report inspection and test findings	**3.1**	WHS/OHS risk control work completion measures and procedures are followed
	3.2	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.3	WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required
	3.4	Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures
	3.5	Non-compliance defects are identified, corrected and/or reported in accordance with workplace procedures
	3.6	Recommendations for rectifying defects are made in accordance with workplace procedures
	3.7	Mandatory documentation is completed in accordance with workplace procedures
	3.8	Tools, equipment and surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures
	3.9	Relevant work permits are signed off and electrical equipment (network infrastructure) returned to service in

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accordance with workplace procedures

3.10 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 UETTDRRT99A Test and verify rail traction installations.

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 UETTDRRT99 Test and verify rail traction installations

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 rail traction installations for suitability using at least two (2) of the following types of inspection techniques:
  - visual*
  - infra-red camera
  - X-ray
  - camera
  - binoculars/telescope
  - (* must do)
- installing at least one (1) of the following alternating current (a.c.) earthing and multiple earth neutral (MEN) or direct current (d.c.) rail connection system components including:
  - pyramid
  - delta pi
  - enterprise specific type
- using at least three (3) of the following:
  - insulators
  - clamps
  - bolts
  - conductor spacers
  - vibration dampers
  - structural components
- solving rail traction installation problems, including at least one (1) of the following types of rail traction conductors:
  - copper
  - aluminium

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  - steel
  - aluminium/steel reinforced
- working safely in confined spaces and aloft using at least one (1) of the following types of mobile plant and height equipment:
  - elevated work platform (EWP)
  - portable platform
  - gondola
  - hook ladder*
  - elevated work box
  - (*must do)
- obtaining relevant testing and measurement equipment, tools and personal protective equipment (PPE) required for testing and verifying rail traction installations including:
  - using the following types of testing and earth/bond equipment:
    - voltage/ de-energised indicating device
    - earthing conductors
- completing all the following:
  - reporting procedures
  - reporting outcomes.

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:

- legislated regulations, including:
  - legislation and regulations that require installations and equipment to be tested to ensure they are safe
  - the person/bodies responsible for the various aspects of ensuring rail traction installations are safe
  - results of tests that show a rail traction installation is safe for connection to the supply
  - 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 the rail traction installations electrical equipment are safe to use
- testing installations, including:
  - rail traction system phasing, phase rotation and polarity is correct and conform to network construction standards
  - electrical rail traction network voltage levels comply with network supply standards
  - potential present upon rail traction network neutral conductors conform network supply standards
  - insulation resistance is adequate
  - earthing system and MEN system components are verified as correctly installed

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- documentation, including:
  - results of tests conducted on a rail traction installation in accordance with work requirements to ensure the rail traction installation is safe
  - documents of periodic inspection and testing of rail traction installation and equipment in accordance with requirements
  - non-compliances and defects reported in accordance with established 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 for testing and verifying rail traction installations
- 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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UETTDRSB21 Diagnose and rectify faults in substation environment

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 diagnose and rectify faults in substation in the electricity supply industry (ESI).

It includes identifying and analysing fault conditions including isolating, repairing and restoring substation control circuits.

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 for fault finding and rectification in power system substation environment	**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

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		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 procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out fault finding within the substation environment	**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/preventative actions taken in accordance with workplace procedures

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	2.6 Faults in power system substation are diagnosed and rectified to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7 Faults are located, identified and affected circuits isolated in accordance with the work schedules, job requirements and workplace procedures
	2.8 Faults in power system substation control circuits are rectified in an agreed timeframe and to workplace quality standards with a minimum of waste
	2.9 Unplanned events in the diagnosis and analysis of faults are responded to in accordance with workplace procedures
	2.10 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills in accordance with requirements
	2.11 Circuit functions are restored in accordance with work schedules, job requirements and workplace procedures
	2.12 Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete fault finding within the substation environment	**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
	3.3 Worksite is cleaned and confirmed 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 Work records, reports and/or documentation 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB21A Diagnose and rectify faults in substation environment.

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 UETTDRSB21 Diagnose and rectify faults in substation environment

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 on at least two (2) of the following system faults:
  - high voltage (HV) circuit breaker control system fault
  - transformer control system fault
  - direct current (d.c.) supply systems fault
  - d.c. switchgear and equipment fault
- diagnosing faults using at least three (3) of the following testers:
  - multimeters
  - tong testers
  - insulation resistance/continuity tester
  - low resistance high current tester
  - overload injection tester
  - specialist test equipment
- 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 (LV0 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 practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; and types, selection, maintenance and use of personal protective equipment (PPE)

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    - 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 switching operations, project charts, switching schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams,

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    - d.c. traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans
    - 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 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
    - calculation of results and data measurements using the computer

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    - 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, 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 substation 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 WHS/OHS requirements associated with the use of EWP

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  - 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 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, 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, 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
- LV substation switching principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the LV switching operator
  - operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, and purpose and procedures for operational forms
  - use, care and operation of equipment associated with LV substation switching
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV substation switching or indicating devices
  - operation of protection systems and substation equipment
  - restrictions pertaining to LV switching equipment
  - earthing LV electrical apparatus practices and procedures for access
  - LV switching techniques

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- restrictions pertaining to enterprise-specific 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, 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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UETTDRSB22 Carry out power systems substation inspection

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 carry out power system substation inspection in the electricity supply industry (ESI).

It includes the security, electrical and environmental inspections of substations, , recording of information and reporting defective/non-compliant conditions in accordance with industry standards and workplace procedures.

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

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 carry out substation inspections	**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

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	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 procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out substation inspections	**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, as appropriate, 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 the immediate authorised persons for directions in accordance with workplace procedures
	2.6	Substation equipment, environmental protection systems and security systems are inspected to comply with job

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	requirements and workplace procedures
	2.7 Critical defects are assessed for level of safety/system impact and communicated to appropriate personnel for further action
	2.8 Minor defects and/or non-conformances are rectified in-situ
	2.9 Substation inspections are performed to ensure completion in agreed timeframes, to quality standards and in accordance with workplace procedures
	2.10 Unplanned events are responded to in accordance with workplace procedures
3 Record the outcomes of substation inspections	**3.1** Completed work is checked against works schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2 Safe working documentation is surrendered 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, 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 and appropriate personnel are 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB22A Carry out power systems substation inspection.

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 UETTDRSB22 Carry out power systems substation inspection

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 substation inspections on at least one (1) of the following:
  - transmission substation
  - distribution substation
  - traction substation
  - zone substation
  - terminal switching stations
- performing substation inspections on all of the following:
  - substation plant and equipment
  - substation environmental systems
  - substation security systems
- performing substation inspection on at least ten (10) of the following:
  - circuit breakers
  - transformers
  - control systems
  - operating mechanism cabinets
  - voltage transformers
  - current transformers
  - surge arrestors
  - capacitor banks
  - static VAR compensator (SVC)
  - synchronous condenser
  - harmonic filters
  - rectifier transformers

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  - rectifiers
  - invertors
  - negative reactors
  - energy dissipation resistors
  - disconnectors/isolators
  - earth switches
  - fault throwing switches
  - sectionalisers
  - a.c. and d.c. supply systems
  - control room environments
  - batteries
  - chargers
  - proving de-energised equipment
  - fire systems equipment
  - oil spill equipment
- 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:

- 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 personal protection equipment (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

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  - 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 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
  - 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, failure in service, including the appropriate procedures for work on in service plant/equipment
  - types of symptoms - alarms, relay flags, mechanical defects, insulation deterioration, leaks, overpressure, under pressure, and 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

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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 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, 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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:

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- 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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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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UETTDRSB24 Maintain high voltage power system circuit breakers

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 high voltage (HV) power system circuit breakers in the electricity supply industry (ESI).

It includes diagnosing faults, repairing and replacing HV power system circuit breakers components in accordance with workplace procedures. It also includes performing diagnostic checks, pre-commissioning tests and function checks involving circuit breakers and associated control circuits and interpreting these tests 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

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

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

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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 HV power system circuit breakers	**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

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		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 procedures
	1.9	Worksite is prepared in accordance with the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out maintenance on HV power system circuit breakers	**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 established 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 established procedures

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	2.6	Essential knowledge and associated skills are applied for the safe maintenance of HV power system circuit breakers and maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Maintenance of HV power system circuit breakers is performed in accordance with work schedules, job requirements and workplace procedures
	2.8	Maintenance of HV power system circuit breakers is completed in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the maintenance of HV power system circuit breakers	**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 HV power system circuit breakers are made ready for service in accordance with workplace procedures
	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 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.

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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 UETTDRSB24A Maintain high voltage power system circuit breakers.

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 UETTDRSB24 Maintain high voltage power system circuit breakers

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 two (2) of the following types of high voltage (HV) power system circuit breakers:
  - bulk oil circuit breakers
  - small oil volume circuit breaker
  - air blast circuit breaker
  - vacuum circuit breaker
  - gas-insulated HV switchgear (GIS) circuit breakers
  - gas circuit breakers
- working on at least two (2) of the following types of operating mechanisms:
  - spring operated mechanism
  - solenoid operated mechanism
  - hydraulic operated mechanism
  - pneumatic operated mechanism
- performing at least three (3) of the following tests:
  - insulation resistance tests
  - contact resistance tests
  - minimum close and open tests (reduced voltage tests)
  - sequence timing tests
  - contact travel/timing test
  - vibration test
  - gas pressure tests
- performing measuring or sampling tests using at least two (2) of the following:
  - gas measuring devices
  - pressure measuring devices

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  - sulfur hexafluoride (SF6) gas sampling
  - oil sampling
  - SF6 moisture content (dew point)
- 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 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
- 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
  - PPE for LV switching
- 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

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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 drawings, 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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, direct current (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

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- 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
  - 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,

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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 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

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appropriate diagrammatic representations
  - LV design specifications, supply requirements, 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
- design principles of hydraulic and pneumatic operating mechanism principles, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, standards, supply authority regulations and-or enterprise requirements
  - control system operating diagrams, including nomenclature, symbols and operating sequences, and units of measurement
  - fundamentals of pressure intensification, forces and energy accumulators
  - applications for substation HV equipment - circuit breaker operating mechanisms, interrupter mechanisms, pumps and compressors, GIS operating mechanisms and transformer cooling systems
  - safety precautions for work on hydraulic and/or pneumatic systems - safe working practices and procedures; identification of hazards, assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- LV substation switching principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
  - role and responsibilities of the LV switching operator
  - operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedures for operational forms, access authorities and permits
  - use, care and operation of equipment associated with LV substation switching
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV substation switching or indicating devices
  - operation of protection systems and substation equipment
  - restrictions pertaining to LV switching equipment
  - earthing LV electrical apparatus practices and procedures for access
  - LV switching techniques
  - restrictions pertaining to enterprise -specific procedures
- circuit breaker operating principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
  - requirements for the use of manuals, circuit breaker diagrams/plans and drawings

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- operation of protection systems and substation equipment associated with circuit breakers
- use, characteristics and capabilities of specialised tools and equipment
- capabilities of operating mechanisms
- capabilities of interrupter chambers
- enterprise-specific policies and procedures for the operation of circuit breakers
- techniques in evaluating serviceability of circuit breaker operation
- control equipment and auxiliary relays, flags and alarms
- safety precautions when constructing circuit breakers - 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 access for operating.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRSB25 Maintain high voltage power and instrument transformers

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 high voltage (HV) power and instrument transformers in the electricity supply industry (ESI).

It includes conducting routine diagnostic tests within agreed specifications and maintaining associated cooling systems, controls, alarm systems and tertiary cabling and/or busbar systems in accordance with workplace procedures.

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 HV power and instrument transformers	**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

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		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 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 HV power and instrument transformers	**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 monitored and preventive action taken and/or appropriate authorities consulted, where necessary, in accordance with workplace procedures

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	2.6	HV power system and instrument transformers are maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Transformers/instrument transformers are isolated and maintained in accordance with manufacturer instructions and workplace procedures
	2.8	Diagnostic measurements are performed and results interpreted, analysed and recorded in accordance with workplace procedures
	2.9	Transformers/instrument transformers are restored in accordance with workplace policies and procedures
	2.10	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of HV power and instrument transformers	**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 transformer/instrument transformer made ready for service
	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 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

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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 UETTDRSB25A Maintain high voltage power and instrument transformers.

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 UETTDRSB25 Maintain high voltage power and instrument transformers

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:
  - power transformer
  - high voltage (HV) reactor
- maintaining at least two (2) of the following:
  - auxiliary transformer
  - current transformer
  - voltage transformer
- performing at least two (2) of the following tests:
  - insulation resistance tests
  - dielectric dissipation factor tests
  - low voltage (LV) excitation checks
  - frequency response analysis
  - recovery voltage measurements
  - ratio checks
  - winding resistance tests
  - oil sampling
  - low resistance, high current connection 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 LV equipment, including:

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  - 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 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
- 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
  - PPE for LV switching
- 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 the 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

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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 drawings, 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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, direct current (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

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  - 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
  - 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

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- 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 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 AC and DC 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
- design principles of HV insulation systems, including:
  - insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation HV plant and equipment, grading,

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construction and cooling
    - common contaminants and their effects - internal contaminants and external contaminants
    - testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections, and safe work practices related to testing and measurement
    - safety precautions when testing and measuring HV insulation systems - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- principles of power transformer construction and operations, including:
    - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step-down transformers, transmission and generation types
    - reactor types - shunt and series, applications and design considerations
    - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
    - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
    - insulation methods and techniques - fully insulated windings and graded insulation techniques, and oil filled and gas filled power transformers
    - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
    - nameplate details - basic insulation level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
    - transformer and reactor cooling types and their effects on design and rating
    - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
    - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
    - operating constraints as single units and in parallel
    - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), and control system characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- LV substation switching principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
    - role and responsibilities of the LV switching operator
    - operational forms, access authorities and permits associated with LV switching - types of

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operational forms, access authorities and permits, purpose and procedure for operational forms, access authorities and permits
- use, care and operation of equipment associated with LV substation switching
- LV switchgear – types, categories, application and operating capabilities
- operation of LV substation switching or indicating devices
- operation of protection systems and substation equipment
- restrictions pertaining to LV switching equipment
- earthing LV electrical apparatus practices and procedures for access
- LV switching techniques
- restrictions pertaining to enterprise-specific 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, 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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UETTDRSB26 Install high current d.c. equipment and switchgear

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 high current equipment and switchgear in the electricity supply industry (ESI).

It includes installing direct current (d.c.) switchgear and other equipment, such as rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors and energy dissipation resistors EDR's to ensure correct installation to workplace procedures and industry standards.

It also includes isolating systems and/or circuits for safe working in accordance with work plans, visual inspections and necessary checks to ensure equipment and components have been correctly installed in accordance with design and are in a safe condition for pre-commissioning tests prior to energisation, as well as updating installation data and relevant quality assurance documentation.

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

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

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UEENEEG063A Arrange circuits, control and protection for general electrical installations

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 high current d.c. switchgear and equipment	**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

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	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 procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out installation of high current d.c. switchgear and equipment	**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 the immediate authorised persons for directions in accordance with workplace procedures
	2.6	High current d.c. switchgear and equipment are installed in accordance with work schedules, job requirements and workplace procedures

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	2.7	High current d.c. switchgear and equipment are safely installed to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete installation of high current d.c. switchgear and equipment	**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
	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 UETTDRSB26A Install high current DC equipment and switchgear.

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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 UETTDRSB26 Install high current d.c. equipment and switchgear

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
- using testing and measuring instruments including all of the following:
  - 1500 V drop out tester
  - ammeter
  - low resistance high current
  - megger tester
  - multimeters
  - voltmeter
- using drawings and diagrams including all of the following:
  - building layouts
  - cable block and schedule diagrams
  - operating and substation arrangement diagrams wiring diagrams
  - schematic drawings
- installing at least six (6) of the following types of equipment:
  - d.c. circuit breakers
  - rectifier transformers
  - rectifiers
  - isolators and links
  - harmonic filters
  - negative reactors
  - energy dissipation resistors
- installing at least ten (10) of the following associated equipment:
  - d.c. feeders
  - surge arresters

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  - isolating links
  - busbars
  - cables
  - cable supports
  - pits and enclosures
  - protection/alarm systems
  - control wiring
  - metering
  - supervisory interface
  - cabinets
  - REC
- installing at least three (3) of the following types of protection:
  - buchholz
  - frame leakage
  - overcurrent
  - earth leakage
  - reverse current
  - delta I
  - diode protection
- performing all of the following terminations and alignments:
  - cable terminations
  - busbar termination/joint
  - alignment of electrical contacts of withdrawable equipment
- 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 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

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  - methods of obtaining the up-to-date information on enterprise policy 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 drawings, 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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, high voltage (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)

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  - 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
- substation d.c. circuit breaker principles, including:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the d.c. circuit breakers
  - types of d.c. circuit breakers- self and withdrawable types
  - characteristics of d.c. circuit breakers- purpose of d.c. circuit breakers and application of d.c. circuit breakers
  - principles of operation of different types of d.c. circuit breakers- arc expulsion versus arc containment, latched versus magnetically held, advantages and disadvantages of different types, fixed or withdrawable and protection/diagnostic technology
  - principles of operation of high-speed d.c. circuit breakers– characteristics and calibration
  - how d.c. circuit breakers are designated - feeder, rectifier, EDR, bus-section and negative breakers, auto-reclose or non-auto-reclose type
  - type and function of d.c. circuit breaker peripheral components - delta I relays, busbar, control wiring, trunk and associated plug/receptacle
  - identification, characteristics, application and care of d.c. circuit breaker components - holding coils, closing coils, contactors, resistors, arc chutes, blow-out coils, arcing contacts, main contacts, braids, moving arm, pole face, arcing horns, electronic cards,

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dashpots, fingers, diode strings, fuses, insulators, latching mechanisms, motors, wiring and relays
    - characteristics, application and care of hand and specialised tools used on d.c. circuit breakers - combination/multigrips/long nose pliers, side cutters, screwdrivers, wire strippers, crimpers, knife, hacksaw, hammers, mallets, levels, tape measures, spanners, T-wrench, pistol drills, battery drills, heat gun, de-soldering tools and soldering iron/torches, Allen keys, socket spanners, gauges, feeler gauges and specialist tools supplied by the manufacturer
    - characteristics, application and care of test and measurement instruments used on d.c. CB's - multimeters, tong testers, ammeters, voltmeters, ohmmeters, test lamps, high and low voltage insulation resistance/ continuity testers, earth resistance tester, ductor and drop-out test sets
- installation of substation d.c. circuit breakers and associated equipment, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation of substation d.c. circuit breakers
    - safety precautions when installing substation d.c. circuit breakers - safe operation procedures; WH/?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; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
    - use and interpretation of technical manuals and diagrams - manufacturer/enterprise manuals; block, wiring and schematic diagrams; 1500 V sectioning diagrams; substation HV operating diagrams; substation arrangement diagrams and layout drawings; technical/manufacturer specifications; and maintenance instructions/schedules
    - techniques in the safe installation of d.c. circuit breakers CB's
- LV substation switching principles including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to LV substation switching
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment
    - role and responsibilities of the LV switching operator
    - operational forms, access authorities and permits associated with LV switching - types of operational forms, access authorities and permits, purpose and procedures for operational forms, and access authorities and permits
    - use, care and operation of equipment associated with LV substation switching
    - LV switchgear – types, categories, application and operating capabilities
    - operation of LV substation switching or indicating devices
    - operation of protection systems and substation equipment
    - restrictions pertaining to LV switching equipment
    - earthing LV electrical apparatus practices and procedures for access
    - LV switching techniques
    - restrictions pertaining to enterprise-specific 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 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, 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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UETTDRSB27 Maintain high current d.c. equipment and switchgear

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 high current direct current (d.c.) equipment and switchgear in the electricity supply industry (ESI).

It includes maintaining d.c. switchgear and other equipment, such as rectifier transformers, rectifiers, invertors, isolators and links, harmonic filters, negative reactors and energy dissipation resistors (EDR)s. It also includes diagnosing of faults and replacement and repair in accordance to workplace procedures and industry standards, isolating systems and/or circuits for safe work in accordance with work plans, visual inspections and necessary checks to ensure safe energisation, and updating of maintenance data and relevant quality assurance documentation.

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

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

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UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 high current d.c. switchgear and equipment	**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

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	1.3	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS)risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and in accordance with workplace procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others and for completion within acceptable timeframes, to agreed quality standards 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 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 high current d.c. switchgear and equipment	**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

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	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions in accordance with workplace procedures
	2.6	Maintenance and repair of high current d.c. switchgear and equipment are maintained and repaired in accordance with works schedules, job requirements and workplace procedures
	2.7	High current d.c. switchgear and equipment are safely maintained to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of high current d.c. switchgear and equipment	**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
	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 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.

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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 UETTDRSB27A Maintain high current DC equipment and switchgear.

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 UETTDRSB27 Maintain high current d.c. equipment and switchgear

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 high current direct current (d.c) switchgear and equipment using all of the following:
  - multimeters
  - low resistance high current
  - megger tester
  - ammeter
  - voltmeter
  - 1500 V drop out tester
  - wiring diagrams
  - schematic drawings
  - operating and substation arrangement diagrams
  - building layouts
  - cable block and schedule diagrams
- maintaining at least six (6) of the following types of equipment:
  - direct current circuit breakers
  - rectifier transformers
  - rectifiers
  - isolators and links
  - harmonic filters
  - negative reactors
  - energy dissipation resistors
- maintaining at least ten (10) of the following associated equipment:
  - d.c. feeders
  - surge arresters

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  - isolating links
  - busbars
  - cables
  - cable supports
  - pits and enclosures
  - protection/alarm systems
  - control wiring
  - metering
  - supervisory interface
  - cabinets
  - REC
- using all of the following:
  - cable terminations
  - busbar termination/joint
  - alignment of electrical contacts of withdrawable equipment
- dealing with unplanned events on at least one 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 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 policy 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

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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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - LV system switching diagrams, d.c. traction supply sectioning diagrams, high voltage (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

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  - 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 the enterprise-specific procedures
  - calculation of results and data measurements using the computer
  - techniques in the preparation of preliminary works creation and closure
- substation d.c circuit breaker principles, including:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the d.c. circuit breakers
  - types of d.c. circuit breakers - self and withdrawable types
  - characteristics of d.c. circuit breakers - purpose of d.c. circuit breakers and application of d.c. circuit breakers
  - principles of operation of different types of d.c. circuit breakers - arc expulsion versus arc containment, latched versus magnetically held, advantages and disadvantages of different types, fixed or withdrawable and protection/diagnostic technology
  - principles of operation of high-speed d.c. circuit breakers – characteristics and calibration
  - how d.c. circuit breakers are designated - feeder, rectifier, EDR, bus-section and negative breakers, auto-reclose or non-auto-reclose type
  - type and function of d.c. circuit breaker peripheral components - delta I relays, busbar,

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control wiring, trunk and associated plug/receptacle

- identification, characteristics, application and care of d.c. circuit breakers components - holding coils, closing coils, contactors, resistors, arc chutes, blow-out coils, arcing contacts, main contacts, braids, moving arm, pole face, arcing horns, electronic cards, dashpots, fingers, diode strings, fuses, insulators, latching mechanisms, motors, wiring and relays
- characteristics, application and care of hand and specialised tools used on d.c. circuit breakers - combination/multigrips/long nose pliers, side cutters, screwdrivers, wire strippers, crimpers, knife, hacksaw, hammers, mallets, levels, tape measures, spanners, T-wrench, pistol drills, battery drills, heat gun, de-soldering tools and soldering iron/torches, Allen keys, socket spanners, gauges, feeler gauges and specialist tools supplied by the manufacturer
- characteristics, application and care of test and measurement instruments used on d.c. circuit breakers - multimeters, tong testers, ammeters, voltmeters, ohmmeters, test lamps, HV and LV insulation resistance/continuity testers, earth resistance tester, ductor and drop-out test sets

- maintenance of substation d.c. circuit breakers and associated equipment, including:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance of d.c. circuit breakers
  - requirements for the use and interpretation of manuals, system diagrams/plans and drawings - 1500V sectioning diagrams, substation HV operating diagrams, substation arrangement diagrams and layout drawings, technical/manufacture specifications and maintenance instructions/schedules
  - relationship and function of d.c. circuit breaker equipment/component interface - d.c. circuit breaker frame, connection fingers, associated busbar, physical arrangements and clearances
  - safety precautions when undertaking maintenance procedures on d.c. circuit breakers - 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; and emergency response and rescue, including first aid
  - techniques in maintenance of d.c. circuit breakers - closing and opening operations, range settings, adjustments and calibration, spring settings, main contact arrangement and auxiliary contact arrangement, arc chute inspection and procedures, basic fault finding and repair/adjustment techniques, control cards, their uses, application and fault finding, and earthing requirements and techniques
  - techniques in testing and commissioning of d.c. circuit breakers - supply authority regulations and/or enterprise requirements, standards and procedures
- installation of substation d.c. circuit breakers and associated equipment including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation of substation d.c. circuit breakers
  - safety precautions when installing substation d.c. circuit breakers - safe operation procedures; WHS/OHS hazards and precautions; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of PPE; permit to work systems

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and isolation procedures; safe working practices when using specialised equipment; and emergency response and rescue, including first aid

- use and interpretation of technical manuals and diagrams - manufacturer/enterprise manuals, block, wiring and schematic diagrams, 1500 V sectioning diagrams, substation HV operating diagrams, substation arrangement diagrams and layout drawings, technical/manufacturer specifications and maintenance instructions/schedules
- techniques in the safe installation of d.c. circuit breakers.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRSB30 Maintain high voltage power system static VAR compensators (SVC)

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 high voltage (HV) power system static VAR compensators (SVC) in the electricity supply industry (ESI).

It includes diagnosing faults, replacing and repairing high voltage power system static VAR compensator components. It also includes diagnostic and return to service tests and interpreting tests 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

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

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

UETTDRSB25 Maintain high voltage power and instrument transformers

UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 HV power system SVC	**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

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	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 procedures
	1.9	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
2 Carry out maintenance on HV power system SVC	**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

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		immediate authorised personnel for directions in accordance with workplace procedures
	2.6	HV power system SVC are safely maintained and repaired to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.7	Pre-service tests and measurements are conducted in accordance with enterprise procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of HV power system SVC	**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 HV power system SVC 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB30A Maintain high voltage power system static VAR compensators (SVC).

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 UETTDRSB30 Maintain high voltage power system static VAR compensators (SVC)

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 two (2) of the following types of equipment:
  - static VAR compensator (SVC) power transformer
  - SVC auxiliary transformer
  - capacitors
  - reactors
  - cooling equipment
- 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:

- 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:

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  - 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 personal protection equipment (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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - low voltage (LV) system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (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

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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
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure
- principles of power system SVC, including:
    - applications of static reactive plant in HV networks, including voltage control, VAR control and transient response capacity
    - types of static reactive plant, including HV capacitors, HV reactors, SVC 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

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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.

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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UETTDRSB31 Maintain high voltage power system synchronous condensers

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 high voltage (HV) power system synchronous condensers in the electricity supply industry (ESI).

It includes diagnosing faults and replacing and repairing high voltage power system synchronous condenser components. It includes diagnostic and pre-commissioning tests involving synchronous condensers and interpreting these tests 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

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 HV power system synchronous condensers	**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

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		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 is 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 maintenance on HV power system synchronous condensers	**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

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	2.6	HV power system synchronous condensers are safely maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.7	Pre-service tests and measurements are conducted in accordance with enterprise procedures
	2.8	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of HV power system synchronous condensers	**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 the power system synchronous condenser 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 or 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 UETTDRSB31A Maintain high voltage power system

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synchronous condensers.

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 UETTDRSB31 Maintain high voltage power system synchronous condensers

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 windings:
  - stator winding
  - rotor winding
- maintaining the following system:
  - cooling system
- maintaining at least one (1) of the following systems:
  - control system
  - alarm system
- 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 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
- LV switching principles, including:

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  - 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
  - PPE for LV switching
- 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

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    - title box - description of parts and version control
- enterprise-specific switching diagrams and drawings, 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 catalogues, and instructions/worksheets
    - interpretation of different system switching diagrams - LV system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (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

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  - 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
  - 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 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 regarding 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

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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 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 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
- synchronous condenser principles, including:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to synchronous condensers
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of synchronous condensers installed
  - identification of components within the synchronous condensers and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for synchronous condensers
  - techniques in evaluating serviceability of synchronous condensers operation
  - safety precautions when testing and measuring synchronous condensers - 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; safe working clearances and communicating worksite procedures
  - 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.

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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, 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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UETTDRSB32 Maintain power transformer on load tap changers (OLTC)

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 power transformer on load tap changers (OLTC) in the electricity supply industry (ESI).

It includes maintaining, repairing and overhauling substation voltage regulating equipment restricted to resistor and reactor type high speed on load tap changers but does not include the main tank tap selector mechanism. It also includes inspecting, recording of information, testing and measuring of associated control circuits, range of acceptance tests required on installed complete units within the parent power transformer, diagnostic and pre-commissioning checks and tests involving tap changers and interpreting these 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

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

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

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UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

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

UETTDRSB25 Maintain high voltage power and instrument transformers

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 to maintain voltage regulating equipment (tap changers)	**1.1** Work schedules, construction plans, drawings, workplace procedures and material lists are obtained and analysed
	1.2 Job requirements and workplace procedures are

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		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 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 (tap changers)	**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

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	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	Oil circuits are isolated and tap changer vessels drained in accordance with workplace and environmental protection procedures
	2.7	Tap changer is withdrawn and maintained in accordance with manufacturer instructions and workplace procedures
	2.8	Pre-service tests and measurements are conducted in accordance with workplace procedures
	2.9	Voltage regulating equipment (tap changers) are safely maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste
	2.10	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the maintenance of voltage regulating equipment (tap changers)	**3.1**	Completed work is checked against works schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	3.2	Safe working documentation is surrendered and transformer 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.

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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 UETTDRSB32A Maintain power transformer on load tap changers (OLTC).

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 UETTDRSB32 Maintain power transformer on load tap changers (OLTC)

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:
  - high speed resistor type and drive mechanism
  - high speed reactor type and drive mechanism
- maintaining at least two (2) of the following pieces of equipment:
  - live tank diverter switch
  - dead tank diverter switch
  - tap selector
- performing at least three (3) of the following tests:
  - insulation resistance tests
  - transition resistor tests
  - contact resistance tests
  - sequence timing tests
  - ratio checks
  - winding resistance tests
  - oil sampling
- 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:

- enterprise-specific policies and procedure instructions, including:
  - responsibilities and duty of care of employer and employee relationship

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- 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 personal protection equipment (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 drawings 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 drawings, 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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - low voltage (LV) system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (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

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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 the enterprise-specific procedures
    - calculation of results and data measurements using the computer
    - techniques in the preparation of preliminary works creation and closure
- principles of power transformer high speed on-load tap changers (OLTC), including:
    - selector types and applications for HV power transformers
    - diverter switch types and applications for HV power transformers, including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag and pennant cycle

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- ratings and construction principles
- operating mechanism types, stored energy systems and associated control systems
- operating principles and operating sequences of selectors and diverters
- measurement requirements, including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
- online diagnostic tools and devices
- ancillary equipment, including online filters, over pressure relays and devices
- testing requirements, including cycle timing, differential delay, energy accumulator mechanical and operational tests, and control system functional tests
- safety precautions when testing and maintaining HV power transformer OLTC - 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.

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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UETTDRSB33 Install high voltage plant and 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 install high voltage (HV) plant and equipment in the electricity supply industry (ESI).

It includes conducting pre-commissioning tests within agreed specifications, installing earthing systems, tertiary cabling and/or busbar systems. It does not include associated protection systems.

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

UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

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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 the installation of HV plant and equipment	**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

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	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 of HV plant and equipment	**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	Earthing requirements are identified and installed or confirmed installed in accordance with workplace procedures
	2.7	Foundations and other appropriate civil works are constructed and/or confirmed ready for the erection of HV plant and equipment
	2.8	HV plant and equipment is erected and associated HV connections, low voltage (LV) controls and supplies are installed in accordance with manufacturer instructions and workplace procedures
	2.9	Remedial actions are taken to overcome shortfalls

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		encountered in the work schedule in accordance with job requirements and workplace procedures
	2.10	Pre-commissioning checks are performed and HV plant and equipment made ready for service in accordance with workplace procedures
	2.11	Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures
	2.12	Essential knowledge and associated skills are applied for the safe installation of HV plant and equipment to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.13	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Complete the installation of HV plant and equipment	**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 installed power system HV plant and equipment 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
	3.6	Associated drawings, schematics and diagrams are updated to reflect work as executed 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB33A Install high voltage plant and 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 UETTDRSB33 Install high voltage plant and 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
- installing at least two (2) of the following pieces of equipment:
  - power transformer
  - high voltage (HV) reactor (series or parallel)
  - auxiliary transformer
  - current transformer
  - voltage transformer
  - capacitor bank
  - circuit breaker
  - high current direct current (d.c.) switchgear and/or equipment
- installing at least two (2) of the following pieces of associated equipment:
  - disconnector
  - fault throwing switch
  - earth switch
  - earth grid connections
  - surge arrestor
  - neutral earthing transformer
  - resistor bank
  - busbar
- performing at least three (3) of the following tests:
  - insulation resistance tests
  - dielectric dissipation factor tests
  - low voltage (LV) excitation checks
  - continuity checks

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  - ratio checks
  - winding resistance tests
  - gas pressure checks
  - timing checks
  - contact resistance checks
- 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 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 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
- 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
  - PPE for LV switching
- 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

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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 drawings 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 drawings, 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 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

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  - 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
  - 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

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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 regarding 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 - the 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:

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  - 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
- design principles of hydraulic and pneumatic operating mechanism principles, including:
  - standards, codes, Commonwealth/state/territory/local government legislation, standards, supply authority regulations and/or enterprise requirements
  - control system operating diagrams, including nomenclature, symbols and operating sequences, and units of measurement
  - fundamentals of pressure intensification, forces and energy accumulators
  - applications for substation HV equipment - circuit breaker operating mechanisms, interrupter mechanisms, pumps and compressors, gas insulated switchgear (GIS) operating mechanisms and transformer cooling systems
  - safety precautions for work on hydraulic and/or pneumatic systems - safe working practices and procedures; identification of hazards, assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- principles of power transformer construction and operations, including:
  - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step-down transformers, transmission and generation types
  - reactor types - shunt and series, applications and design considerations
  - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
  - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
  - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
  - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
  - nameplate details - basic insulation level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
  - transformer and reactor cooling types and their effects on design and rating
  - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
  - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common

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methods of diagrammatic representation of winding configuration
    - operating constraints as single units and in parallel
    - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), and control system characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- circuit breaker operating principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
    - requirements for the use of manuals, circuit breaker diagrams/plans and drawings
    - operation of protection systems and substation equipment associated with circuit breakers
    - use, characteristics and capabilities of specialised tools and equipment
    - capabilities of operating mechanisms
    - capabilities of interrupter chambers
    - enterprise specific policies and procedures for the operation of circuit breakers
    - techniques in evaluating serviceability of circuit breaker operation
    - control equipment and auxiliary relays, flags and alarms
    - safety precautions when constructing circuit breakers - 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 access for operating

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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

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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UETTDRSB34 Carry out surveys using thermovision techniques

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 carry out surveys using thermovision techniques in the electricity supply industry (ESI).

It includes thermographic inspections of transmission/distribution systems and/or substation equipment. It also includes surveying, inspecting, recording information and reporting of defective/non-compliant conditions in accordance with workplace procedures.

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 carry out thermographic surveys	**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

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	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 is 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 thermographic surveys	**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, as appropriate, 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	Circuit load conditions are assessed, relevant personnel and/or organisations consulted and appropriate circuit

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		adjustments made prior to survey in accordance with workplace procedures
	2.7	Substation equipment and/or transmission/distribution systems are surveyed, joints, connections and components surveyed and assessed in accordance with workplace procedures
	2.8	Non-conformance defects are assessed for level of safety/system impact and communicated to appropriate personnel for further action in accordance with workplace procedures
	2.9	Circuits are restored to pre-survey conditions and appropriate personnel/organisations informed in accordance with workplace procedures
	2.10	Thermographic surveys are performed to ensure completion in agreed timeframes, to quality standards and minimum waste in accordance with workplace procedures
	2.11	Unplanned events or conditions are responded to in accordance with workplace procedures
3 Record the outcomes of thermographic surveys	**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 if appropriate
	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.

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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 UETTDRSB34A Carry out surveys using thermovision techniques.

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 UETTDRSB34 Carry out surveys using thermovision techniques

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 surveys using thermovision techniques in one (1) of the following substations:
  - transmission substation
  - distribution substation
  - traction substation
  - zone substation
- performing surveys using thermovision techniques on at least one (1) of the following:
  - substation apparatus and equipment
  - transmission/distribution system conlow resistance high currents and components
- performing surveys using thermovision techniques on at least three (3) of the following associated equipment:
  - disconnectors
  - transmission/distribution system conlow resistance high currents
  - mid-span joints
  - bolted palms and connections
  - terminations
  - jumpers
  - pot heads
- 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:

- enterprise specific policies and procedure instructions, including:

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  - 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 personal protection equipment (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 drawings 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 drawings, 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 catalogues, and instructions/worksheets
  - interpretation of different system switching diagrams - low voltage (LV) system switching diagrams, direct current (d.c.) traction supply sectioning diagrams, high voltage (HV) transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- enterprise-specific specialised tools, including:

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- 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, 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 the 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

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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 regarding 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

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and materials; and oil containment facilities and systems
    - rescue and release procedures - the 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 HV insulation systems, including:
    - insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation HV plant and equipment, grading, construction and cooling
    - common contaminants and their effects - internal contaminants and external contaminants
    - testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections, and safe work practices related to testing and measurement
    - safety precautions when testing and measuring HV insulation systems - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use PPE
- principles of power transformer construction and operations, including:
    - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step-down transformers, transmission and generation types
    - reactor types - shunt and series, applications and design considerations
    - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
    - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
    - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled, and gas filled power transformers
    - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships and impedance percent
    - nameplate details - basic insulation level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
    - transformer and reactor cooling types and their effects on design and rating
    - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
    - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
    - operating constraints as single units and in parallel
    - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types), and control system

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characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- circuit breaker operating principles, including:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
    - requirements for the use of manuals, circuit breaker diagrams/plans and drawings
    - operation of protection systems and substation equipment associated with circuit breakers
    - use, characteristics and capabilities of specialised tools and equipment
    - capabilities of operating mechanisms
    - capabilities of interrupter chambers
    - enterprise-specific policies and procedures for the operation of circuit breakers
    - techniques in evaluating serviceability of circuit breaker operation
    - control equipment and auxiliary relays, flags and alarms
    - safety precautions when constructing circuit breakers - 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 access for operating.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRSB35 Maintain discrete control and protection 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 the isolation, inspection, testing, adjustment, repair, refurbishment and/or overhaul and functional checks of discrete protection and control devices. It includes the requirements to prove the functionality of discrete devices, such as direct current (d.c.) supplies, overcurrent, overload, earth fault, transformer temperature controls, alarms and indication circuits.

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 for the maintenance of discrete protection and control devices	**1.1** Work schedules, including drawings, plans, requirements procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to

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		ensure safe systems of work are followed and according to established procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order
	1.7	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work
	1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures
	1.9	Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out the maintenance of discrete protection and control devices	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures

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	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.6	Maintenance of discrete protection and control devices is undertaken according to requirements and established procedures
	2.7	Data is analysed and compared with compliance specifications to ensure completion of the maintenance work is within an agreed timeframe and according to requirements
	2.8	Essential knowledge and associated skills are applied for the safe maintenance of discrete protection and control devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the maintenance of discrete protection and control devices	**3.1**	Final inspections of discrete protection and control devices are undertaken and checked against the work schedule to ensure they comply with all requirements, including all required documentation
	3.2	Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and transformer made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Required work completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB35A Maintain discrete control and protection 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 UETTDRSB35 Maintain discrete control and protection 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
- undertaking functional checks and testing of discrete control and protection devices including all of the following:
  - isolate discrete protection
  - control and indications
  - overcurrent and earth fault relays
  - direct current (d.c.) supplies
  - trip and control circuits
  - alarms and indications
  - function test of discrete devices
- inspecting discrete control and protection devices including at least three (3) of the following:
  - neutral displacement
  - no-volt changeover
  - discrete auto-reclose
  - d.c. frame leakage
  - oil surge (site maintenance)
  - voltage regulation
  - parallel operation
  - thermal overloads
  - transformer temperature control devices
  - CEL fail
- 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:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of isolation and tagging procedures associated with protection testing encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
  - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
  - techniques in documenting isolations
  - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
  - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance procedures
  - requirements for the use of maintenance manuals, system diagrams/plans and drawings
  - techniques in maintenance procedures – planning, policy and testing techniques
  - close out requirements
- relay manufacturer specifications encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
  - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
  - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants, encompassing:
  - 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

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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 personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
- techniques in the handling and disposing of insulation materials - polychlorinated biphenyls (PCB), asbestos, insulating Oil and sulfur hexafluoride (SF6) gas.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRSB36 Commission discrete control and protection 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 the commissioning/testing of discrete protection and control systems and includes isolation, inspection, monitoring, testing, adjustment and functional checks on systems, such as overcurrent, overloads, earth fault, alarms and controls.

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

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

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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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

UETTDRSB25 Maintain high voltage power and instrument transformers

UETTDRSB29 Maintain capacitor bank equipment for voltage regulation

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 for the commissioning/testing of discrete protection and control systems	**1.1** Work schedules, including drawings, plans, requirements procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety

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		(WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order
	1.7	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work
	1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures
	1.9	Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out the commissioning/testing of discrete protection and control systems	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Lifting, use of power tools/equipment techniques and

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		practices are safely exercised in accordance with established 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 according to established procedures
	2.6	Commissioning/testing of discrete protection and control systems is undertaken according to requirements and established procedures
	2.7	Data is analysed and compared with compliance specifications to ensure commissioning/testing of the discrete system is completed within an agreed timeframe and according to requirements
	2.8	Essential knowledge and associated skills are applied for the safe commissioning/testing of discrete protection and control systems to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the commissioning/testing of discrete protection and control systems	**3.1**	Final inspections and functional testing of the discrete protection and control systems are completed and checked to ensure compliance with all requirements
	3.2	Anomalies between requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and discrete protection and control systems are made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Required work completion records, reports and/or documentation and information are completed, processed and appropriate personnel notified in

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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 UETTDRSB36A Commission discrete control and protection 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 UETTDRSB36 Commission discrete control and protection 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
- undertaking final inspections and functional testing of the discrete protection and control systems including all of the following:
  - isolating protection
  - inspecting controls and alarms with discrete protection and control systems
  - isolating current transformers
  - calibrating discrete protection and control relays
  - carrying out function tests (trips and alarms) on discrete protection and control systems without assistance
  - writing reports on the performance of discrete protection and control systems
- undertaking commissioning and testing of discrete control and protection devices including at least three (3) of the following:
  - overcurrent
  - frame leakage
  - cooling controls
  - buchholz/surge protection
  - direct current (d.c.) supplies control
  - neutral displacement circuit breaker reclose
  - d.c. frame leakage
  - CEL fail
  - earth fault
- 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:

- commissioning procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy and testing techniques
  - close out 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 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, 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

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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UETTDRSB37 Maintain power system distribution field devices

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 maintenance of automatic circuit reclosers (ACRs), gas switches, regulators and line capacitors; and communication systems, including mobile phones and trunked mobile radio (TWR). It includes secondary injection, timing and function tests, and proving correct tripping, reclosing and remote operation.

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

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

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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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

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 for the maintenance of distribution field devices	**1.1** Work schedules, including drawings, plans, requirements, procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according

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		to established procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures
	1.5	Risk control measures are identified, prioritised, implemented and evaluated against the work schedule
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order
	1.7	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work
	1.8	Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures
	1.9	Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out the maintenance of distribution network field devices	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to

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		immediate authorised personnel for directions according to established procedures
	2.6	Essential knowledge and associated skills are applied for the safe maintenance of distribution field devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.7	Maintenance, including testing of distribution field devices, is undertaken according to requirements and established procedures
	2.8	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the maintenance of distribution network field devices	**3.1**	Functional checks of distribution field devices are completed and all work checked against the requirements to ensure compliance
	3.2	Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and transformer made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Approved copies of the maintenance of distribution network field devices documents are issued and records updated 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.

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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 UETTDRSB37A Maintain power system distribution field devices.

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 UETTDRSB37 Maintain power system distribution field devices

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
- undertaking functional checks and testing of power system distribution field devices including all of the following:
  - assembly
  - functional checks
  - applying device settings
  - secondary injections
  - timing
  - remote operations
- maintaining power system distribution field devices including at least three of the following:
  - Automatic circuit reclosers (ACRs)
  - gas switches
  - regulators
  - line capacitors
  - mobile phone systems
  - trunked mobile radio (TMR) systems
- 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:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)

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    - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of isolation and tagging procedures associated with protection testing encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
    - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
    - techniques in documenting isolations
    - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
    - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance procedures associated with discrete protection schemes encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance procedures
    - requirements for the use of maintenance manuals, system diagrams/plans and drawings
    - techniques in maintenance procedures – planning, policies and testing techniques
    - close out requirements
- relay manufacturer specifications encompassing:
    - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
    - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
    - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants, encompassing:
    - 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 personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue, including first aid
    - techniques in the handling and disposing of insulation materials - polychlorinated

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biphenyls (PCB), asbestos, insulating oil and sulfur hexafluoride (SF6) gas.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRSB38 Commission power system distribution field devices

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 commissioning of automatic circuit reclosers (ACRs), gas switches, regulators and line capacitors; and communication systems, including mobile phones and trunked mobile radio (TMR). It also includes communication with the operating authority, testing, clearing after testing and energising using techniques that are acceptable to the operating authority.

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

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

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

UETTDRSB37 Maintain power system distribution field devices

Pathway 1 - Electrician

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Pathway 2 - Electrical Fitter

UEENEEG199A Conduct compliance and functional verification of electrical apparatus and existing circuits

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 for the commissioning of distribution field devices	**1.1** Work schedules, including drawings, plans, requirements, procedures and material lists, are acquired, analysed and the extent of work determined
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

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	1.3	Hazards are identified, work health and safety (WHS)/occupational health and safety (OHS) risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.4	Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to agreed quality standards and in accordance with established policies and procedures
	1.5	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, acquired and confirmed safe and in technical working order
	1.6	Liaison issues with other personnel and/or authorities are resolved and activities coordinated to facilitate the work
	1.7	Personnel participating in the work, including plant operators and contractors, are fully briefed, their respective responsibilities explained and coordinated, and appropriate authorisation checked in accordance with established procedures
	1.8	Worksite is prepared according to the work schedule and to minimise risk and damage to property and personnel in accordance with established procedures
2 Carry out the commissioning of distribution network field devices	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidence of accidents and minimise waste are implemented and monitored in accordance with established procedures
	2.2	Cardiopulmonary resuscitation (CPR), rescue from live electrical apparatus and other related safety procedures are in place according to requirements and established procedures
	2.3	Safe working documentation is acquired and requirements completed in accordance with established procedures
	2.4	Lifting, use of power tools/equipment techniques and practices are safely exercised in accordance with

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		established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks monitored and preventive action taken and/or appropriate authorities consulted, where necessary, in accordance with established procedures
	2.6	Commissioning, including testing of distribution field devices, is undertaken according to requirements and established procedures
	2.7	Data is analysed and compared with compliance specifications to ensure completion of the maintenance work is within an agreed timeframe and according to requirements
	2.8	Essential knowledge and associated skills are applied for the safe commissioning of distribution network field devices to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.9	Unplanned events or conditions are responded to in accordance with established procedures
3 Complete the commissioning of distribution network field devices	**3.1**	Functional checks of distribution field devices are completed and all work checked against the requirements to ensure compliance
	3.2	Anomalies between the work schedule requirements and measured performance are reported and solutions identified in accordance with established procedures
	3.3	Safe working documentation is surrendered and transformer made ready for service
	3.4	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.5	Tools, equipment and any surplus resources and materials are cleaned, checked and returned to storage in accordance with established procedures
	3.6	Documents and records related to the distribution field devices are updated 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSB38A Commission power system distribution field devices.

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 UETTDRSB38 Commission power system distribution field devices

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
- undertaking all of the following:
  - applying device settings
  - secondary injections
  - timing
  - remote operations
  - earthing checks
  - calibrations
- undertaking commissioning and testing of power system distribution field devices including at least three (3) of the following:
  - automatic circuit reclosers (ACRs)
  - gas switches
  - regulators
  - line capacitors
  - mobile phone systems
  - trunked mobile radio (TMR) systems
- 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:

- commissioning procedures associated with distribution protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations

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and/or enterprise requirements associated with the commissioning procedures
- requirements for the use of commissioning manuals, system diagrams/plans and drawings
- techniques in commissioning procedures – planning, policies and testing techniques
- close out 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 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, 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

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

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UETTDRSO32 Manage power systems network faults

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 management of single incident faults on electrical network plant to ensure prompt restoration of supply to affected customers.

Electrical network plant includes feeders, transformers and busbars from transmission to distribution voltages. The unit includes single incident faults ranging from simple (involving a single item and no loss of supply) to complex (involving multiple substations with extensive loss of supply). The unit also encompasses liaison with operating authorities and dispatching and managing field crews, as well as the monitoring of safe access to the network.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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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UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO41 Manage power systems transmission networks

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO41 Manage power systems transmission networks

UETTDRSO42 Manage power systems transmission network demand

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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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 for the management of a network fault	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of network faults, are reviewed and determined
	1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of network faults are obtained or established with appropriate personnel
	1.4 Identification and testing procedures are discussed with/directed to appropriate personnel in order to ascertain the occurrence of a network fault
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work

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	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.12	Action plan is developed in accordance with requirements and established procedures
2 Carry out the management of a network fault	**2.1**	Action plan is initiated and continually monitored to ensure outcomes are being met
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the network fault solution in accordance with requirements and/or established procedures
	2.3	Network fault management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network fault management procedures is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged, coordinated and evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements

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	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of a network fault	**3.1**	Final inspection of the network is undertaken to ensure it complies with all requirements and report includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of network fault management documents are issued and records are updated 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 UETTDRSO32A Manage power systems network faults.

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 UETTDRSO32 Manage power systems network faults

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
- managing a network fault, including all of the following:
  - identifying a network fault by interpreting available alarms and event data
  - developing a plan to enable management of a network fault
  - implementing plans in order that the network be restored after a fault has occurred
  - effectively liaising with operating authorities and field crews to restore the network after a fault has occurred
  - documenting/debriefing actions upon restoration of the network
- 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:

- enterprise-specific procedures and work practices relating to fault restorations encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to fault restorations
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise operating procedures
  - techniques in the applying enterprise operating procedures
- use of fault information to analyse and develop optimal network restoration strategies encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations standards, codes and/or enterprise requirements applicable to the analysis of protection targeting

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- requirements for the use of operational manuals, system diagrams/plans and drawings
- techniques in the collation of protection data
- techniques in the analysis and assessment of fault information – public, employee and protection equipment
- application methods of fault information to analyse and develop optimal network restoration strategies - public and employee safety, and enterprise reliability guidelines
- resource availability.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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.
- relevant modelling tools, drawings, computerised electrical plant control and monitoring facilities

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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UETTDRSO33 Manage power systems critical events

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 management of critical events, such as simultaneous multiple network faults and storm events of various magnitudes. It includes liaison procedures with multiple operating authorities and dispatching and managing multiple field crews. It also encompasses monitoring of safe access to the network and invoking crisis management procedures and mutual aid plans.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO32 Manage power systems network faults

UETTDRSO41 Manage power systems transmission networks

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO41 Manage power systems transmission networks

UETTDRSO42 Manage power systems transmission network demand

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

Unit Sector

Not applicable.

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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 the management of a critical event	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of critical events, are reviewed and determined
	1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of events are obtained or established with appropriate personnel
	1.4 Identification and testing procedures are discussed with/directed to appropriate personnel in order to ascertain the occurrence of a critical event
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or

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		established procedures
	1.12	Action plan is developed
2 Carry out the management of a critical event	**2.1**	Action plan is initiated and continually monitored to ensure outcomes are being met
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the network fault solution in accordance with requirements and/or established procedures
	2.3	Network fault management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of critical event management procedures is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation

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		initiatives in accordance with established procedures
3 Complete the management of a critical event	**3.1**	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
	3.2	Final review of the management procedures of the critical event is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.3	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.4	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.5	Approved copies of critical event management documents are issued and records are updated 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 UETTDRSO33A Manage power systems critical events.

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 UETTDRSO33 Manage power systems critical events

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
- managing a critical event including all of the following:
  - identifying a critical event
  - developing a plan to enable management of a critical event
  - implementing plans in order that the network be restored after the critical event has occurred
  - effectively liaising with operating authorities and field crews to restore the network after a critical event has occurred
  - documenting/debriefing actions upon restoration of the network
- 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:

- enterprise-specific procedures and work practices relating to critical events encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to critical events
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise operating procedures
  - techniques in applying enterprise operating 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 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, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures 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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UETTDRSO34 Control power systems generating plant

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 control of the generation side of a generation plant. It includes the assessment, evaluation and achievement of the synchronisation requirements to ensure machine and/or system stability during synchronisation. It also includes the control of the generation of electrical energy, the coordination of the generation control and the monitoring of the system/plant.

It also encompasses the analysis of the system/plant faults, the updating of the relevant documentation and the reporting of plant problems, movements, abnormalities and status in accordance with enterprise/site procedures.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

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UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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 for the control of a generation plant	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the control of the generating plant, are reviewed and determined
	1.2 Purpose of the control is established after data is analysed and expected outcomes of the work are

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		confirmed with appropriate personnel
	1.3	Organisational established procedures on policies and specifications for the control of the generating plant are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the control of a generation plant	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Decisions for the control of the generating plant are made on the basis of safety and effective outcomes according to requirements and/or established procedures

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	2.4	Mathematical and/or engineering models of the control procedures are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of control procedures is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the control of a generation plant	**3.1**	Final review of the control procedures of the generating plant are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the documents are issued and records are updated in accordance with established

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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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO34A Control power systems generating plant.

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 UETTDRSO34 Control power systems generating plant

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
- managing an electricity generating plant including all of the following:
  - operating generator and excitation systems
  - controlling and coordinating generation of electrical energy
  - analysing prime mover and alternator faults
  - effectively liaising with operating and regulatory authorities
  - recording events using both written and computerised logging systems
  - documenting/debriefing actions following an event resulting in loss of generation
- 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:

- enterprise-specific procedures and work practices relating to generating plant encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the procedures and work practices relating to generating plant
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise operating procedures
  - techniques in applying enterprise operating procedures
- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of high voltage (HV) and low voltage (LV)
  - voltage control devices - voltage regulators applied to generators and synchronous phase

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modifiers; electromagnetic voltage regulators; series and parallel capacitors; on-load tap changer (OLTC) transformers and static VAR compensators (SVC's), including saturated reactor compensators, thyristor controlled reactor compensators and combined systems
    - production of harmonics and methods of harmonic control
    - location of voltage control devices within the system
- power flow control encompassing:
    - use of system components to control power flow patterns - base load, spinning reserve, regulating machines, rapid start plant, phase shifting transformers and load shedding
    - principles of automated control
    - synchronising power
    - relationship of power and frequency
    - machine stabilisation techniques
    - system oscillations and stability - damped and undamped oscillation, relationship of fault clearance times and system stability, and critical clearance times
- alternators operation and control encompassing:
    - constructional features of alternators - weights, lengths, cooling mediums, cooling systems, prime mover types, prime mover attachment, types of windings and core arrangements
    - principle of operation - induction machines and synchronous machines
    - modes of operation - island and infinite bus operation, running up of prime movers, loading the alternator, requirements for synchronising and methods of synchronising
    - use of reactive capability diagram - related diagram types, current circle diagram, performance chart, capability diagram, values represented, per unit representation, and limits representation and meaning
    - automatic voltage regulators (AVR) - need for voltage control, required attributes of an AVR, range, response time, constraints on AVR capability, desirable attributes of an AVR, power consumption, compensation, rotor stabilisation and automatic changeover systems, input and output requirements and components
    - operation on an infinite bus - definition of infinite bus, power/angle dependence, reactive flow/voltage dependence, power/angle diagram, effect of saliency, transient conditions, practical and theoretical stability limits, voltage dependence of stability, control of reactive flow using AVR and generator transformer tap changer
- prime mover principles encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the prime movers
    - requirements for the use of operational manuals, system diagrams/plans and drawings
    - types, characterizes and applications of energy sources and conversion systems – wind, steam turbine, gas turbine and diesel.

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, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures 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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UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

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 management of the switching of high voltage (HV) network components with due regard to the loadings and prevailing network constraints and includes scheduling of generators, VAR compensators, load shedding and non-essential loads in response to National Electricity Market Management Company (NEMMCO) or network requirements. It also includes voltage control equipment.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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 for the management of HV distribution and sub-transmission network demand	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of HV distribution and sub-transmission network systems, are reviewed and determined
	1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of the network

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		demand are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of HV distribution and sub-transmission network demand	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Management of HV distribution and sub-transmission network demand decisions are made on the basis of safety and effective outcomes according to requirements

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		and/or established procedures
	2.4	Mathematical models of the HV distribution and sub-transmission network demand are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of HV distribution and sub-transmission network demand is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of HV distribution and sub-transmission network demand	**3.1**	Final inspections of the network demand are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where

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applicable, statutory or regulatory approval

3.4 Approved copies of the managed HV distribution and sub-transmission network demand documents are issued and records are updated 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 UETTDRSO35A Manage high voltage distribution and subtransmission network demand.

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 UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

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
- demonstrating at least three (3) system manipulations that encompass the following:
  - high voltage (HV) sub-transmission distribution network
  - transmission network manipulation to control loading on equipment
  - transformers with HV windings
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
- managing multiple switching instructions
- coordinating the status of access permits/authorities on HV network equipment
- ensuring network plant operates within design and regulatory requirements on a real time basis
- calculating line loading
- preparing and authorising HV distribution switching programs
- demonstrating application of supervisory control and data acquisition (SCADA) or equivalent
- analysing, diagnosing and reporting system failures
- calculating and analysing paralleling conditions on the interconnected HV system as applicable to the entity
- preparing, writing and checking switching sheets to undertake all of the following:
  - managing load
  - managing voltage
  - minimising loss
  - maximising system reliability
  - allowing safe network access for maintenance activities
  - allowing safe network access for construction activities

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  - validating fault reports arising from system disturbances
- 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:

- enterprise-specific procedures and work practices relating to managing network demand encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
  - requirements for the use of demand management manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise demand management procedures
  - techniques in applying enterprise demand management procedures
- effective management and communication encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
  - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, range of support services and expertise available
  - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication, negotiation and mentoring; and strategies for positive feedback
  - techniques in leadership in achieving enterprise strategic and operational plans
  - techniques in managing relationships under stress - stress management
- methodology used in writing enterprise-specific management reports encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the writing enterprise-specific management reports
  - techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems, and storing and retrieving data from computer systems
  - relationship of management reports to enterprise policies and procedures - enterprise

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structure and resources, workplace WHS/OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures

- techniques in writing enterprise-specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas, and compliance and legislative requirements to produce effective reports in the appropriate format.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation including, workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures 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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UETTDRSO36 Develop low voltage distribution switching programs

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 preparation and/or checking of activities required to place the low voltage (LV) distribution network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format.

It includes planning outages and taking into account loading of network components. It also includes planning the management of multiple outages on the LV distribution network and the calculation of network loading conditions to ensure the network is operating within designed parameters.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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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UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

System Operations

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 for the preparation of LV distribution switching programs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of LV distribution switching systems, are reviewed and determined
	1.2 Purpose of the switching program preparation is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the LV distribution switching systems are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications

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	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the preparation of LV distribution switching programs	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	LV distribution switching program decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the LV switching systems are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

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	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7 Testing of LV switching program is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives as per established procedures
3 Complete the preparation of LV distribution switching programs	**3.1** Final review of the switching program is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the preparation of LV distribution switching programs documents are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO36A Develop low voltage distribution switching programs.

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 UETTDRSO36 Develop low voltage distribution switching programs

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
- demonstrating at least three (3) switching programs that between them encompass at least seven (7) of the following:
  - a transformer with a low voltage (LV) winding and fixed tap
  - LV busbars
  - LV isolators
  - LHV switchgear (applicable to enterprise equipment)
  - phasing and phase rotation
  - commissioning an item of LV plant
  - a planned interruption to a LV customer
  - installation of a mobile generators
- preparing switching instructions to isolate, test and earth all of the following:
  - all enterprise transformer types with LV windings
  - all enterprise LV busbar types
  - all enterprise LV feeder types
  - all enterprise LV circuit breakers, isolators or switches
- preparing, writing and checking switching sheets to do all of the following:
  - manage load
  - manage voltage
  - minimise losses
  - maximise network reliability
- checking all above types of switching instructions
- coordinating all above types of switching instructions
- calculating plant loading
- applying and administrating supervisory control and data acquisition (SCADA) or

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enterprise-specific system
- analysis and diagnosis of system failure
- 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:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; and how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- control of generator systems for synchronisation of a LV genset encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator encompassing:
  - safety precautions specific to the synchronisation of gensets - safe working practices and procedures, and synchronising procedures
  - techniques in the installation of gensets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of LV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single LV job - overhead systems, indoor systems, customer installations and kiosk substations
- different types and function of distribution components encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - types, functions and characteristics of distribution components
  - safety policies and procedures precautions related to the handling and installing distribution components
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions

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and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
    - techniques in analysing, planning, coordination and organising work for a safe outcome and according to statutory requirements and regulations
    - techniques in the effective utilisation of available resources
    - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
    - techniques in facilitating and coordinating the delivery and issuing of access authorities
    - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite; earth access authorities; safe working area; work to be carried out in confined space or in hazardous environment; specific outsourcing procedures; specific hazard identification, risk classification and management procedures; regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issuing and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on LV
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- principles of isolation and tagging procedures associated with protection testing encompassing:
    - Commonwealth/state/territory legislation standards, codes, , supply authority regulations and/or enterprise requirements associated with installation, maintenance, isolation and tagging procedures
    - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
    - techniques in documenting isolations
    - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
    - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- LV switching principles encompassing:
    - 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,

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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
- LV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, safe approach distances, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching, and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- LV overhead and substation switching principles encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to LV overhead and substation switching
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
    - operational forms, access authorities and hazard/risk assessments associated with LV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
    - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
    - LV switchgear – types, categories, application and operating capabilities
    - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air break 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 LV switching equipment
    - procedures for the isolation of LV distributions main and working earths
    - earthing LV electrical apparatus practices and procedures for access authority issuing

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    - LV switching techniques
    - operating switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a LV switching instruction encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched, isolation points and earthing, and responsibilities of the switching operator
    - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
    - 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
- enterprises-specific WHS/OHS instructions encompassing:
    - 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 personal protection equipment (PPE) - type and application; where and when to be used; method of replacement; responsibility for 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 switching diagrams and drawing encompassing:
    - 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, direct current (d.c.) traction supply sectioning diagrams, HV transmission and distribution system symbols and feeder plans, and processes of updating switching diagrams
- LV system load calculation principles encompassing:
    - structure of LV systems
    - ratings of LV system components
    - methods of determining load on LV systems
    - records of load on LV systems
    - effect of added load on LV mains - variation of current, voltage and power factor
    - load flow in parallel operation
    - enterprise-specific network coordination 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 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, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures 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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UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

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 preparation and/or checking of activities required to place the high voltage (HV) distribution and sub-transmission network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format.

It includes planning outages and taking into account loading of network components. It also includes planning the management of multiple outages on the HV distribution and sub-transmission network and the calculation of network loading conditions to ensure the network is operating within designed parameters.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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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UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

System Operations

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 for the preparation of HV distribution and sub-transmission switching programs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of HV distribution and sub-transmission switching system programs, are reviewed and determined
	1.2 Purpose for the preparation of HV distribution and sub-transmission switching programs is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the preparation of HV distribution and sub-transmission switching programs are obtained or established with appropriate personnel
	1.4 Testing/switching procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief

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	1.5	Testing/switching parameters are established from organisational established procedures and policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the preparation of HV distribution and sub-transmission switching programs	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Preparation of HV distribution and sub-transmission switching program decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the program is used to analyse the effectiveness of the finished project in accordance with requirements and established procedures

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	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the program is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the preparation of HV distribution and sub-transmission switching programs	**3.1**	Final review of the switching program is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of prepared HV distribution and sub-transmission switching program documents are issued and records are updated 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO37A Develop high voltage distribution and subtransmission switching programs.

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 UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

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
- demonstrating at least three (3) switching programs that between them encompass the following:
  - a transformer with a high voltage (HV) winding and fixed tap
  - a transformer with a HV winding and on-load tap changer (OLTC)
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
  - phasing and phase rotation
  - commissioning an item of HV plant
  - a planned interruption to a HV customer
  - installation of a mobile generators (if applicable to enterprise equipment)
  - placing distribution feeders in parallel where special considerations are required to cope with capacitors, phase shifts between different bulk supply systems, sensitive earth fault protection and single phase switching
- preparing switching instructions to isolate, test and earth all of the following:
  - all enterprise transformer types
  - all enterprise busbar types
  - all enterprise feeder types
  - all enterprise circuit breakers, isolators or switches
- preparing, writing and checking switching sheets to do all of the following:
  - manage load
  - manage voltage
  - minimise losses
  - maximise network reliability

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- checking all above types of switching instructions
- coordinating all above types of switching instructions
- calculating plant loading
- 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:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; and how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders; and the HV equipment associated with substations
- different types and function of distribution components encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to the use and application of distribution components
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings
  - types, function and characteristics of distribution components
  - safety policies and procedures precautions related to the handling and installing distribution components
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordination and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical

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network diagrams for the specific worksite; earth access authorities; safe working area; work to be carried out in confined space or in hazardous environment; specific outsourcing procedures; specific hazard identification, risk classification and management procedures; regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issuing and receipt of operating agreements
- principles of Statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on High Voltage
    - particular reference to state and territory regulations regarding working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV switching principles encompassing:
    - 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 procedures for operational forms, 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 effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (PPE) 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
- HV fault switching principles encompassing:
    - primary causes, effects and types of HV electrical faults

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- 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 encompassing – function and application
- circuit condition requirements and switching considerations when paralleling and separating HV feeders

- HV single wire earth return (SWER) system encompassing:
  - application and function of SWER system components
  - circuit arrangement
  - principle of operation
  - hazards and procedures associated with faulty SWER earth systems
  - procedure to isolate, energise and commission SWER substations
- HV system switching principles, including switching authorisation procedures, encompassing:
  - 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
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- HV overhead and substation switching principles encompassing:
  - 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, and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and permits hazard/risk assessments; purpose and procedures 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

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switching, live line indicators, capacitors, reclosers, sectionalisers, underslung links, air-breaks, 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, 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
- preparation of a HV switching instruction schedule encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the switching operator
    - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures, and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
    - 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
- enterprises-specific WHS/OHS instructions encompassing:
    - standards, codes, legislation, supply authority regulations and specific enterprise regulations pertaining to the WHS/OHS policies and procedures
    - methods of obtaining the up-to-date information on enterprise WHS/OHS policies and procedures
    - specific enterprise personal protection equipment (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

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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
- substation switching practices encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to substation switching
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, and identifying switching resources
    - techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and commissioning procedures
    - use, care and operation of equipment associated with HV substation equipment - test instruments and sticks
    - HV switchgear – types, categories, application and operating capabilities
    - basic operation of protection systems
    - restrictions pertaining to HV substation switching equipment
    - restrictions pertaining to enterprise-specific procedures
- transient overvoltage encompassing:
    - causes and effects of transient overvoltage - switching transients and lightning transients, and effects on plant items
    - control techniques and systems - diverters, shield wires and CB arc control
    - insulation systems - insulation coordination and insulation grading
- procedures to undertake a visual inspection of a scheme encompassing:
    - Commonwealth/state/territory legislation standards, codes, , supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identify obvious deficiencies in operating to the standard functionality
    - techniques in determining device malfunction
    - techniques in determining wiring defects
- commissioning procedures associated with relevant equipment encompassing:
    - Commonwealth/state/territory legislation standards, codes, , supply authority regulations and/or enterprise requirements associated with the commissioning procedures
    - requirements for the use of commissioning manuals, system diagrams/plans and drawings
    - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- effects of harmonics encompassing:
    - characteristics and effects of harmonics on protection device functions/malfunction

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    - effects of harmonics on transformers, generators, motors and quality of supply
- different types and function of distribution underground components encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the use and application of distribution underground components
    - requirements for the use of underground line construction manuals, system diagrams/plans and drawings
    - types, function and characteristics of distribution underground components
    - safety policies, procedures and precautions related to handling and installing distribution underground components
- HV system load calculation principles encompassing:
    - structure of HV systems
    - ratings of HV system components
    - relationship to HV customers
    - methods of determining load on HV systems
    - records of load on HV systems
    - effect of added load on HV feeders - variation of current, voltage, power, reactive power and power factor
    - load flows in parallel or loop operation
    - enterprise-specific network coordination 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 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, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals

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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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UETTDRSO38 Develop and evaluate power systems transmission switching programs

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 development and evaluation of activities required to place the transmission network in a state in which work can safely be performed whilst minimising customer outages. The format is typically a written sequence of switching items in a pre-defined format.

It includes planning for the management of the network and multiple outages. It encompasses the calculation of network loading conditions to ensure the network will operate within design parameters and in compliance with national electricity code.

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.

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Pre-requisite Unit

Common Unit Group

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

System Operations

Unit Sector

Not applicable.

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 Plan and coordinate for the preparation of HV transmission switching programs	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined
	1.2 Purpose of the switching program is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the switching program are obtained or established with appropriate personnel
	1.4 Switching procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
	1.5 Switching parameters are ascertained from established policies, procedures and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with other/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out and coordinate the preparation of HV transmission switching	**2.1** Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures

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programs		
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Decisions concerning the preparation of the HV transmission switching program are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	The effectiveness of the finished project is analysed in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the program is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the preparation of HV transmission switching programs	**3.1**	Final review of the switching program is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are

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finalised/commissioned

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of switching program documents are issued and records are updated 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 UETTDRSO38A Develop and evaluate power systems transmission switching programs.

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 UETTDRSO38 Develop and evaluate power systems transmission switching programs

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 and evaluating at least four (4) switching programs that between them integrates all of the following:
  - a transformer with an extra-high voltage (EHV) winding
  - EHV busbars
  - EHV isolators
  - EHV switchgear (applicable to enterprise equipment)
  - phasing and phase rotation
- commissioning a project that includes more than one (1) item of EHV plant that includes a transformer:
  - a planned liaison with a high voltage (HV) customer
  - activities that address the correction of errors in the process
- preparing switching instructions, testing and earthing all of the following:
  - transformer types
  - busbar types
  - transmission line types
  - circuit breakers, isolators or switches
- conducting all of the following:
  - checking switching instructions
  - calculating plant loading
  - managing the development of multiple switching programs
- 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:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram and, how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply system within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the HV equipment associated with substations
- substations and power transformers encompassing:
  - relationship between the substations within an overall power system - purpose and location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - characteristics of a reactors - description and purpose
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordination and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management

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procedures, and regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issue and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV switching principles encompassing:
    - 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 effectiveness of operational earthing, acceptable industry procedures, personal protective equipment (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 system switching principles, including switching authorisation procedures to an extent indicated by the following aspects:
    - 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

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  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances (SAD)
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- HV overhead and substation switching principles encompassing:
  - 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
  - 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
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the

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switching operator
    - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
- enterprise-specific policies and procedure instructions encompassing:
    - 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 OHS instructions encompassing:
    - 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 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
- substation switching practices encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to substation switching
    - requirements for the use of manuals, substation diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, and identifying switching resources
    - techniques in HV substation switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and commissioning procedures
    - use, care and operation of equipment associated with HV substation equipment - test instruments and sticks

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  - HV switchgear – types, categories, application and operating capabilities
  - basic operation of protection systems
  - restrictions pertaining to HV substation switching equipment
  - restrictions pertaining to enterprise-specific procedures
- transient over voltages encompassing:
  - causes and effects of transient over voltages - switching transients and lightning transients, and effects on plant items
  - control techniques and systems - diverters, shield wires and circuit breaker arc control
  - insulation systems - insulation coordination and insulation grading
- commissioning procedures associated with relevant equipment encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and-or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- EHV generator control systems encompassing:
  - legislation, standards, codes,3 supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
  - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
  - EHV generator set and control system to EHV distribution assets
- different types and function of transmission components encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the use and application of transmission components
  - requirements for the use of transmission line construction manuals, system diagrams/plans and drawings
  - types, function and characteristics of transmission components
  - safety policies and procedures precautions related to the handling and installing transmission components
- EHV system load calculation principles encompassing:
  - structure of EHV transmission systems
  - ratings of EHV system components
  - relationship to EHV customers
  - relationship to generation sources
  - methods of determining load on EHV systems
  - records of load on EHV systems

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- effect of added load on EHV transmission systems - variation of current, voltage, power, reactive power and power factor
- load flows in parallel or loop operation
- enterprise-specific network coordination 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 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, computerised electrical plant control and monitoring facilities and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, modelling tools, drawings 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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UETTDRSO39 Coordinate low voltage distribution networks

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 monitoring of low voltage (LV) distribution networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and management of field repair crews to respond to and rectify abnormalities.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO36 Develop low voltage distribution switching programs

Competency Field

System Operations

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 for the management of an LV distribution network	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of LV distribution network systems, are reviewed and determined
	1.2 Purpose for the management of an LV distribution network is established after data is analysed and expected outcomes of the work are confirmed with the appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of an LV distribution network are obtained or established with the appropriate personnel
	1.4 Testing procedures are discussed with/directed to the appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance

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		criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with other/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of an LV distribution network	**2.1**	Circuit/systems modelling are used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the LV distribution network are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

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	an agreed timeframe according to requirements
	2.7 Testing of the LV distribution network is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of an LV distribution network	**3.1** Final review of the management procedures of the LV distribution network are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the managed LV distribution network documents are issued and records are updated 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.

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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 UETTDRSO39A Coordinate low voltage distribution networks.

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 UETTDRSO39 Coordinate low voltage distribution networks

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
- demonstrating on at least three (3) occasions the coordinate system manipulations that encompass the following:
  - low voltage (LV) distribution network
  - LV network manipulation to control loading on equipment
  - transformers with LV windings (if applicable to enterprise equipment)
  - LV busbars
  - LV isolators
  - LV switchgear (applicable to enterprise equipment)
- completing all of the following:
  - writing switching instructions
  - checking switching instructions
  - coordinating switching instructions
  - calculating plant loading
  - preparing and authorising LV distribution switching programs
  - monitoring switching progress
  - monitoring the status of access permits/authorities on LV network equipment
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - dispatching and communicating with field crews to respond/rectify system abnormalities
  - applying and administrating supervisory control and data acquisition (SCADA) (if applicable to enterprise equipment)
  - analysing and diagnosing system failures
  - calculating and analysing paralleling conditions on the interconnected LV system
- monitoring and managing switching to:

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  - manage load
  - manage voltage
  - minimise loss
  - maximise system reliability
  - allow safe network access for maintenance activities
  - allow safe network access for construction activities
  - validating fault reports arising from system disturbances
- 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:

- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- LV system switching principles, including switching authorisation procedures, encompassing:
  - 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
  - types and characteristics of LV systems and equipment to be switched

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  - procedures for obtaining correct LV switching authorisation - 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 and procedures for coordination of operations
  - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and high voltage (HV) customers and operating agreements
  - techniques in coordinating and directing HV and LV switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to LV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, and access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, air break switches, disconnects, live line clamps, phasing

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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; types and applications
    - restrictions pertaining to LV switching equipment
    - procedures for the isolation of LV distributions main and working earths
    - earthing LV electrical apparatus practices and procedures for access authority issuing
    - LV switching techniques
    - operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- preparation of a LV switching instruction encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet schedules
    - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; isolation points and earthing; and responsibilities of the switching operator
    - techniques in writing switching schedules - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification 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, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals.

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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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UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

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 monitoring of high voltage (HV) distribution and sub-transmission networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and coordination of field repair crews to respond to and rectify abnormalities and liaison with other electrical authorities.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

Competency Field

System Operations

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 for the coordination of HV distribution and sub-transmission network	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of HV distribution and sub-transmission network, are reviewed and determined
	1.2 Purpose of the coordination of the network is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the coordination of the network are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

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	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the coordination of HV distribution and sub-transmission network	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

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		an agreed timeframe according to requirements
	2.7	Testing of coordination process is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the coordination of HV distribution and sub-transmission network	**3.1**	Final review of the coordination processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of coordination documents are issued, and records updated 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO40A Coordinate high voltage distribution and sub-transmission networks.

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 UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

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
- demonstrating on at least three (3) occasions the coordination of system manipulations that encompass:
  - high voltage (HV) sub-transmission and distribution network
  - HV sub-transmission and distribution network manipulation to control loading on equipment
  - transformers with HV windings (if applicable to enterprise equipment
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
- completing all of the following:
  - writing switching instructions
  - checking switching instructions
  - coordinating switching instructions
  - calculating plant loading
  - preparing and authorising HV sub-transmission and distribution switching program
  - monitoring switching progress
  - monitoring the status of access permits/authorities on HV network equipment
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - dispatching and communicating with field crews to respond/rectify system abnormalities
  - applying and administrating supervisory control and data acquisition (SCADA) (if applicable to enterprise equipment)
  - analysing and diagnosing system failures
  - calculating and analysing paralleling conditions on the interconnected HV system

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- monitoring and managing switching to:
  - manage load
  - manage voltage
  - minimise loss
  - maximise system reliability
  - allow safe network access for maintenance activities
  - allow safe network access for construction activities
  - validating fault reports arising from system disturbances
- 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:

- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- HV system switching principles, including switching authorisation procedures, encompassing:
  - 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

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  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances (SAD)
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and low voltage (LV) switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
  - 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, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with HV overhead and substation equipment -

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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; 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
  - 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
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched; points of isolation and earthing locations (safety and working earths); and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification 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, protection, control, metering and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards,

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equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures 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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UETTDRSO41 Manage power systems transmission networks

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 monitoring of extra high voltage (EHV) transmission networks in real time. This includes voltage control and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and management of field repair crews to respond to and rectify abnormalities and liaison with other electrical authorities.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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 for the management of transmission networks	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of transmission network systems, are reviewed and determined
	1.2 Purpose of the management of the transmission networks is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the management of transmission

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networks are obtained or established with appropriate personnel

1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief

1.5 Testing parameters are established from organisational established procedures on policies and specifications

1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

1.7 Work roles and tasks are allocated according to requirements and individual competencies

1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work

1.10 Risk control measures are identified, prioritised and evaluated against the work schedule

1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures

2 Carry out the management of transmission networks

2.1 Circuit/systems modelling is used to evaluate alternative proposals as per established procedures

2.2 WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures

2.3 Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures

2.4 Mathematical and/or engineering models of the transmission network are used to analyse the

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		effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of management processes is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of transmission networks	**3.1**	Final review of management processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of management procedure documents are issued and records are updated 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO41A Manage power systems transmission networks.

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 UETTDRSO41 Manage power systems transmission networks

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
- demonstrating on at least three (3) occasions the management of system manipulations encompassing:
  - extra high voltage (EHV) transmission network
  - EHV network manipulation to control loading on equipment
  - transformers with EHV windings (if applicable to enterprise equipment)
  - EHV busbars
  - EHV isolators
  - EHV switchgear (applicable to enterprise equipment)
- undertaking all of the following:
  - writing switching instructions
  - checking switching instructions
  - coordinating switching instructions
  - calculating plant loading
  - preparing and authorising EHV switching programs
  - monitoring switching progress
  - monitoring the status of access permits/authorities on EHV network equipment
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - dispatching and communicating with field crews to respond/rectify system abnormalities
  - applying and administrating of supervisory control and data acquisition (SCADA) (if applicable to enterprise equipment)
  - analysing and diagnosing system failures
  - calculating and analysing network conditions on the interconnected EHV system
- monitoring and managing switching to:

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- manage load
- manage voltage
- minimise loss
- maximise system reliability
- allow safe network access for maintenance activities
- allow safe network access for construction activities
- validating fault reports arising from system disturbances

- 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:

- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- high voltage (HV) system switching principles, including switching authorisation procedures, to encompassing:
  - 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
  - types and characteristics of HV systems and equipment to be switched

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  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and low voltage (LV) switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
  - 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 -

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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; 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
  - 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
- preparation of a HV switching instruction schedule encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching instruction schedules
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of HV electrical equipment to be switched, points of isolation and earthing locations (safety and working earths), and responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification 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, protection, control, metering, and alarm equipment, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards,

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equipment specifications, regulations, codes of practice, operational event data, network drawings, crisis management procedures and operation manuals.

Links

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UETTDRSO42 Manage power systems transmission network demand

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 units covers the management of the switching of transmission network components with due regard to the loadings and prevailing network constraints, including scheduling of generators, Volt Ampere Reactive (VAR) compensators, load shedding and non-essential loads in response to National Market Management Company (NEMMCO) or network requirements. It also includes voltage and frequency controls.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO41 Manage power systems transmission networks

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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 for the management of transmission network demand	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of transmission network demand systems, are reviewed and determined
	1.2 Purpose of the management of transmission network demand is established after data is analysed and expected outcomes of the work are confirmed with

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		appropriate personnel
	1.3	Organisational established procedures on policies and specifications for the management of transmission network demand are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of transmission network demand	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in according with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures

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	2.3	Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the transmission network demand are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of management process is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the management of transmission network demand	**3.1**	Final review of management process is undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where

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applicable, statutory or regulatory approval

3.4 Approved copies of the managed transmission network demand documents are issues and records are updated 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 UETTDRSO42A Manage power systems transmission network demand.

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 UETTDRSO42 Manage power systems transmission network demand

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
- demonstrating at least three (3) system manipulations encompassing:
  - extra high voltage (EHV) transmission network
  - transmission network manipulation to control loading on equipment
  - transformers with EHV windings
  - EHV busbars
  - EHV isolators
  - EHV switchgear (applicable to enterprise equipment)
  - dispatch of static/synchronous VAR compensation (if applicable to enterprise)
  - dispatch of generation (if applicable to enterprise)
- undertaking all of the following:
  - writing switching instructions
  - analysing and reviewing switching instructions
  - managing multiple switching instructions
  - calculating line loading
  - preparing and authorising EHV transmission switching programs
  - demonstrating application and administration of supervisory control and data acquisition (SCADA) or equivalent
  - analysing and diagnosing of system failure
  - calculating and analysing transmission line conditions on the interconnected EHV system
- preparing, writing and checking switching sheets to:
  - manage load
  - manage voltage
  - minimise loss
  - maximise system reliability

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- allow safe network access for maintenance activities
- allow safe network access for construction activities
- validating fault reports arising from system disturbances
- dispatch static/synchronous VAR compensation (if applicable to enterprise)
- dispatch generation (if applicable to enterprise)

- 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:

- enterprise-specific procedures and work practices relating to managing network demand encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
  - requirements for the use of demand management manuals, system diagrams/plans and drawings
  - identify and interpret enterprise demand management procedures
  - techniques in applying enterprise demand management procedures
- effective management and communication encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
  - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers, such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, and range of support services and expertise available
  - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication, negotiation and mentoring; and strategies for positive feedback
  - techniques in leadership in achieving enterprise strategic and operational plans
  - techniques in managing relationships under stress - stress management
- methodology used in writing enterprise-specific management reports encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the writing

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enterprise-specific management reports

- techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems, and storing and retrieving data from computer systems
- relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace WHS/OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
- techniques in writing enterprise-specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas, and compliance and legislative requirements to produce effective reports in the appropriate format.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, computerised electrical plant control and monitoring facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant network modelling tools, drawings, operational event data, 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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UETTDRSO43 Coordinate low voltage distribution network demand

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 coordination of the switching of low voltage (LV) distribution network components with due regard to the loadings and prevailing network constraints, including scheduling of generators, Volt Ampere Reactive (VAR) compensators, load shedding and non-essential loads in response to National Electricity Market Management Company (NEMMCO) or network requirements. It also includes voltage control equipment.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO36 Develop low voltage distribution switching programs

UETTDRSO39 Coordinate low voltage distribution networks

Competency Field

System Operations

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 for the coordination of LV distribution network demand	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of LV distribution network demand systems, are reviewed and determined
	1.2 Purpose of the coordination of the network demand is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the coordination of the network demand are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment

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		(PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the coordination of LV distribution network demand	**2.1**	Circuit/systems modelling are used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

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	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the coordination process is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the coordination of LV distribution network demand	**3.1**	Final review of the coordination process is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of managed LV distribution network demand documents are issues and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO43A Coordinate low voltage distribution network demand.

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 UETTDRSO43 Coordinate low voltage distribution network demand

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
- demonstrating at least three (3) coordination of multiple simultaneous system manipulations that encompass the following:
  - low voltage (LV) distribution network
  - LV network manipulation to control loading on equipment
  - transformers with LV windings (if applicable to enterprise equipment)
  - LV busbars
  - LV isolators
  - LV switchgear (applicable to enterprise equipment)
- coordinating LV distribution network demand including all of the following:
  - writing switching instructions
  - checking and review switching instructions
  - coordinating multiple simultaneous switching instructions
  - confirming line loading
  - preparing and authorising LV distribution switching programs
  - coordinating multiple switching processes
  - coordinating the status of all access permits/authorities on LV network equipment relevant to the scope
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - applying and administrating of supervisory control and data acquisition (SCADA) or equivalent
  - analysing, diagnosing and reporting of system failure
  - calculating and analysing paralleling conditions on the interconnected LV system
- allowing safe network access for maintenance activities, including preparing, writing and

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checking switching sheets to:

- manage load
- manage voltage
- minimise loss
- maximise system reliability
- allow safe network access for maintenance activities
- allow safe network access for construction activities
- validating fault reports arising from system disturbances

- 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:

- enterprise-specific procedures and work practices relating to managing network demand encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
  - requirements for the use of demand management manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise demand management procedures
  - techniques in the applying enterprise demand management procedures
- effective management and communication encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
  - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, and range of support services and expertise available
  - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication, negotiation and mentoring; and strategies for positive feedback
  - techniques in leadership in achieving enterprise strategic and operational plans

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  - techniques in managing relationships under stress - stress management
- methodology used in writing enterprise-specific management reports encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the writing enterprise-specific management reports
  - techniques in researching, collating and analysing information for the report - recording, filing, retrieving systems; and storing and retrieving data from computer systems
  - relationship of management reports to enterprise policies and procedures - enterprise structure and resources, workplace WHS/OHS and risk management enterprise data, financial and operational data, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - techniques in writing enterprise-specific management reports - methods used to disseminate information and facilitate enterprise requirements, document proformas, and compliance and legislative requirements to produce effective reports in the appropriate format.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, modelling tools, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, drawings 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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UETTDRSO44 Develop crisis power systems management plans

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 preparation of crisis management plans, which can be implemented following the loss of one or more items of plant. This unit involves the activities associated with the assessment of risk, the probability of failure, the consequences of failure and the plant and/or network loads that will result according to established enterprise procedures.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO32 Manage power systems network faults

UETTDRSO33 Manage power systems critical events

UETTDRSO41 Manage power systems transmission networks

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO41 Manage power systems transmission networks

UETTDRSO42 Manage power systems transmission network demand

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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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 for the development of crisis management plans	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures which may influence the development of crisis management plans systems are reviewed and determined
	1.2 Purpose of the development of crisis management plans is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the development of crisis management plans are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry

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		out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the development of crisis management plans	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Development of crisis management plan decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the development are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of crisis development plans is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements

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	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the development of crisis management plans	**3.1**	Final review of the crisis management plans is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the developed crisis management plan documents are issued and records updated 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 UETTDRSO44A Develop crisis power systems management plans.

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 UETTDRSO44 Develop crisis power systems management plans

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 crisis management plans, including all of the following:
  - identifying a crisis event
  - developing a plan to manage a crisis
  - formulating plans in order that the network be restored during and after the crisis
  - effectively liaising with operating authorities and field crews to develop and formulate achievable crisis management plans
  - documenting/debriefing actions that are required following an end of crisis situation
- 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:

- enterprise-specific procedures and work practices relating to critical events encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to critical events
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - identifying and interpreting enterprise operating procedures
  - techniques in the applying enterprise operating procedures
- methodology in analysing network event records encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the analysis of critical events
  - requirements for the use of critical event data, manuals, system diagrams/plans and

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drawings
    - sources of critical event data
    - analyse and assess network event records and relevant data - the use of event records and data to analyse and develop optimal network restoration strategies taking into account public and employee safety, enterprise reliability guidelines and resource availability
    - safety policies, procedures and precautions related to critical events - WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); checking integrity of the system for minimum disruption; effective communication methods and chain of command; and emergency response and rescue, including first aid procedures
- preparation of policies and procedures encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the preparation of policies and procedures
    - types of standard forms, documentation and data
    - techniques in disseminating policies and procedures
    - techniques in undertaking approval 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 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, protection, control, metering, and alarm equipment, computerised electrical plant control and monitoring facilities, and PPE currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, relevant network drawings, operational event data, crisis management procedures and operation manuals.

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Links

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UETTDRSO45 Operate and monitor system SCADA 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 covers the skills and knowledge to operate, monitor and control high voltage (HV) apparatus on the network via supervisory control and data acquisition (SCADA) control.

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

UETTDREL15 Respond to power systems technical enquiries and requests

Competency Field

System Operations

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 and prepare for the operation, monitoring and control of system equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed

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		and determined
	1.2	System requirements are established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	System and associated equipment operational prerequisites are identified and established in accordance with manufacturer and/or enterprise/site procedures
	1.4	System monitoring and control procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
	1.5	Operational parameters are ascertained from established policies, procedures and specifications
	1.6	Work roles and tasks are allocated according to requirements and individual competencies
	1.7	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.8	Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.9	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.10	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out and coordinate the operation, monitoring and control of system equipment	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Decisions concerning the operation, monitoring and control of system equipment are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	The effectiveness of the finished project is analysed in accordance with requirements and established

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		procedures
	2.4	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.6	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.7	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the operation, monitoring and control of system equipment	**3.1**	Final review of the operation, monitoring and control of system equipment is undertaken to ensure it complies with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria 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 UETTDRSO45A Operate and monitor system SCADA 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 UETTDRSO45 Operate and monitor system SCADA 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
- performing on at least three (3) occasions the following:
  - evidence of switching programs involving the operation and monitoring of system equipment via supervisory control and data acquisition (SCADA)
- performing on at least two (2) occasions the following:
  - evidence of unplanned switching events involving the operation and monitoring of system equipment via SCADA
- demonstrating the following:
  - extracting data used in the analysis of network loading trends
- 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:

- SCADA systems 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, and hardware requirements
  - 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, and corrective action of alarm status
- personal computer operating systems encompassing:
  - basic function, components and concepts

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- operating systems in use
- system installation and configuration

- computers applications encompassing:
  - application software types
  - configurations and preferences
  - use of particular software packages - word processor, spreadsheet, database, presentation software, web/document publisher, computer-aided drafting (CAD)/drawing packages, email client and business management
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, a distribution and a rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders, and the HV equipment associated with substations
- enterprise-specific policies and procedure instructions encompassing:
  - 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 encompassing:
  - 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 personal protection equipment (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

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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
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings; and for plans, such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on low voltage (LV) and high voltage (HV) systems - overhead distribution extensions, underground distribution extensions, distribution substations and street lighting 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 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 SCADA equipment currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, relevant modelling tools, drawings 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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UETTDRSO46 Monitor and control the field staff activities

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 monitoring of permit to work requests, dispatching personnel, responding to alarms, travel and activity monitoring of field personnel, monitoring work activities of field personnel against work schedule.

It also includes contingency skills, response to third-party enquiries, out of hour, response to man down alarm, tracking of field personnel (remote area), monitoring activities on system equipment, monitoring availability of assets (maintain a log), monitor equipment status, coordinating field activities, controlling and authorising field works, and preparing incident reports.

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

To minimise incidents related to safe systems of work, entry into this unit requires at a minimum that an individual has demonstrated or possesses relevant technical engineering discipline competencies of at least AQF level 3. It is intended that an individual will be expected to perform with a large degree of autonomy in decision making, whilst in an individual environment.

This may include immediate response to protect human life, adverse effect on safety, security of supply or the integrity of the assets.

NOTE: Typically the following disciplines provide direct entry; electrical or instrumentation, fitting and turning or mechanical trade.

Where an individual does not possess or demonstrate the requisite entry requirement, an equivalent bridging program should be used to ensure equivalence of entry.

Competency Field

System Operations

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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 for the monitoring and controlling of field activities	**1.1** Work schedules, plans, requirements and established procedures are detailed and analysed and, if necessary, the extent of the preparation of the work determined for planning and coordination
	1.2 Shift handover detail is received, understood and confirmed according to established procedures
	1.3 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.4 Risk control measures for identified hazards are prioritised, implemented and evaluated against the work schedule
	1.5 Salient system constraints are communicated to relevant persons and identified for worksites in accordance with established procedures
	1.6 Operational and commercial requirements are communicated to stakeholders in accordance with established procedures
	1.7 Work health and safety (WHS)/occupational health and safety (OHS), environmental and sustainable energy policies and procedures related to the work are identified to ensure safe systems of work are followed
	1.8 Relevant work permits are secured to coordinate the performance of work according to requirements and established procedures
	1.9 Liaison and communication with authorised personnel, authorities, clients and land owners is performed/actioned and activities are coordinated to

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		carry out work
2 Undertake monitoring and controlling of field activities	**2.1**	WHS/OHS policies and procedures and safe work practices are followed to eliminate or minimise incidents and hazards
	2.2	Work is performed and coordinated in accordance with work schedules and established procedures
	2.3	WHS/OHS risks are monitored and action taken according to established procedures
	2.4	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and established procedures
	2.5	Essential knowledge and associated skills are applied in an agreed timeframe and to quality standards efficiently according to requirements and established procedures
	2.6	Solutions to non-routine problems are identified and actioned using essential knowledge and associated skills according to requirements
	2.7	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer to community and industry standards
3 Complete monitoring and controlling of field activities	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies are reported and solutions identified in accordance with established procedures
	3.2	Relevant work permit(s) and field activities are signed off and the status of plant, equipment and personnel movements recorded and handover procedures are conducted in accordance with established procedures
	3.3	Shift handover detail is relayed and confirmed according to established procedures
	3.4	Work completion records, reports, documentation and information is confirmed, processed and appropriate personnel notified

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 UETTDRSO46A Monitor and control the field staff activities.

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 UETTDRSO46 Monitor and control the field staff activities

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
- completing all the following:
  - evaluating, responding to and reporting threats to systems operation/security
  - identifying and reporting abnormal conditions of the network
  - using relevant field permit to work systems
  - responding correctly to alarms
  - monitoring field work activities
  - communicating effectively in the workplace
  - operating communications equipment
  - interpreting technical drawings and symbols
  - following emergency response procedures
  - utilising relevant WHS/OHS legislation, regulations, codes of practice, policies and procedures
  - applying planning skills
- 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:

- personal computer operating systems encompassing:
  - basic function, components and concepts
  - operating systems in use
  - system installation and configuration
- transmission, distribution and rail systems encompassing:

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  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements such WHS/OHS and electrical safety
  - techniques in receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- implementation and monitoring requirements for the impact of powerline installations and operation on the environment and/or the area surrounding the powerline and/or equipment encompassing:
  - identification of relevant legislation, codes and government guidelines for the implementation and monitoring of environmental impact factors in the workplace and areas of power distribution or transmission - Commonwealth/state/territory legislation relevant to the workplace and the Environment Protection Act legislation and common law
  - identification, assessment, control and monitoring of the hazards to the environment

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associated with the powerline industry
    - workplace environment quality standards enterprise plan - setting of acceptable emission level limits from power plant equipment, impact of the enterprise activities on air and water quality, nature, impact and level of emissions from power plant, power distribution and transmission equipment and network infrastructure (noise generation, noxious gas emissions, greenhouse gas production, electromagnetic emissions, electromagnetic field strength, oil leakage and insulation breakdown products)
    - provision of manufacturer and supplier information, such as material safety data sheets (MSDS)
    - gathering of environment management information
    - maintenance of environmental records
    - risk assessment and its management in powerline industry
    - maintenance strategies for environment protection programs - developing processes for promoting, maintaining and improving environmental impact in the workplace; and identifying techniques for evaluating and reviewing environment protection education and training programs and elements of an effective environment protection management system; Environment Protection Authority (EPA) consultation and accident/incident investigations
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles, including switching authorisation procedures encompassing:
    - 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
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances (SAD)
    - responsibilities and protocols for identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
    - 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

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  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and LV switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator
  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- HV overhead and substation switching principles encompassing:
  - 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

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  - 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; 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
  - 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
- LV overhead and substation switching principles encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to LV overhead and substation switching
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV electrical equipment to be switched; use, characteristics and capabilities of specialised tools and testing equipment; and role and responsibilities of the LV switching operator
  - operational forms, access authorities and hazard/risk assessments associated with HV switching - types of operational forms, access authorities and hazard/risk assessments, purpose and procedure for operational forms, access authorities and hazard/risk assessments
  - use and operation of equipment associated with LV overhead and substation equipment - test instruments, sticks, interrupters and arc stranglers
  - LV switchgear – types, categories, application and operating capabilities
  - operation of LV overhead switching or indicating devices - fuses, disconnect fuses, load switching, underslung links, airbreak 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; types and applications
  - restrictions pertaining to LV switching equipment
  - procedures for the isolation of LV distributions main and working earths
  - earthing LV electrical apparatus practices and procedures for access authority issuing
  - LV switching techniques
  - operate switching apparatus - identifying hazards, assessing and controlling risks associated with LV switchgear operation, systematic and defensive techniques, mobile radio procedures and double isolation procedures
- enterprise-specific policies and procedure instructions encompassing:
  - 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, 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 encompassing:
  - 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 OHS policies and procedures
  - specific enterprise personal protection equipment (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
- effective management and communication encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to assisting in effective management and communication
  - enterprise operational principles - workplace WHS/OHS enterprise plan, environmental enterprise policies and procedures, industrial relations policies and procedures, and anti-discrimination policies and procedures
  - relationship between the management and employees - methods used to collate and distribute/disseminate information, responsibilities of each member of the work team, staff development activities and legislation requirements with regard to WHS/OHS training, methods of addressing barriers such as literacy and cultural differences, and provisions relating to WHS/OHS issue resolution
  - techniques associated with organisational policies and procedures related to human resources - relevant awards and certified agreements, legislation impacting on people management, and range of support services and expertise available
  - techniques in managing relationships - identifying problems; methods of conflict resolution; methods of consultation, communication, negotiation and mentoring; and strategies for positive feedback
  - techniques in leadership in achieving enterprise strategic and operational plans

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- techniques in managing relationships under stress - stress 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 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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UETTDRSO47 Coordinate high voltage transmission network

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 monitoring of high voltage (HV) transmission networks in real time. This includes power quality, alarm interpretation, facilitating and monitoring the status of access authorities and ensuring that the network is operated within design parameters at all times. It also includes dispatching and coordination of field repair crews to respond to and rectify abnormalities and liaise with other electrical authorities.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO38 Develop and evaluate power systems transmission switching programs

Competency Field

System Operations

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 for the coordination of HV transmission networks	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of HV transmission networks, are reviewed and determined
	1.2 Purpose of the coordination of the network is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the coordination of the network are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications

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	1.6	Work roles and tasks are allocated according to requirements and individual competencies
	1.7	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.8	Liaison and communication issues with other authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.9	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.10	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the coordination of HV transmission networks	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Coordination decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the coordination process are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative actions can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

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	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of coordination process is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the coordination of HV transmission networks	**3.1**	Final review of the coordination processes is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of coordination documents are issued and records are updated 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO47A Coordinate high voltage transmission network.

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 UETTDRSO47 Coordinate high voltage transmission network

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
- demonstrating on at least three (3) occasions the coordination of system manipulations that encompass:
  - high voltage (HV) sub-transmission and distribution network
  - HV sub-transmission and distribution network manipulation to control loading on equipment
  - transformers with HV windings (if applicable to enterprise equipment
  - HV busbars
  - HV isolators
  - HV switchgear (applicable to enterprise equipment)
- coordinating a HV transmission network, including all of the following:
  - writing switching instructions
  - checking switching instructions
  - coordinating switching instructions
  - calculating plant loading
  - preparing and authorising HV sub-transmission and distribution switching programs
  - monitoring switching progress
  - monitoring the status of access permits/authorities on HV network equipment
  - ensuring network plant operates within design and regulatory requirements on a real time basis
  - dispatching and communicating with field crews to respond/rectify system abnormalities
  - applying and administrating of supervisory control and data acquisition (SCADA) (if applicable to enterprise equipment)
  - analysing and diagnosing system failures
  - calculating and analysing paralleling conditions on the interconnected HV system

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- allowing safe network access for maintenance activities, including monitoring and managing switching, to:
  - manage load
  - manage voltage
  - minimise loss
  - maximise system reliability
  - allow safe network access for maintenance activities
  - allow safe network access for construction activities
  - validating fault reports arising from system disturbances
- 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:

- HV fault switching principles encompassing:
  - 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 encompassing – function and application
  - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- coordinating and directing switching instructions encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements applicable to switching sheet instructions
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the coordination and directing of switching schedules instructions
  - relationship between the operating authorities and HV customers, and operating agreements
  - techniques in coordinating and directing HV and low voltage (LV) switching of electrical networks
  - requirements for the use of manuals, system diagrams/plans and drawings - types, characteristics and capabilities of LV and HV electrical equipment to be switched
  - responsibilities of the switching operator

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  - techniques in writing switching instructions - sequence of switching operations, isolation procedures, earthing procedures and switching completion notification procedures
  - techniques in gathering, collating and confirming data on switching procedures
- alternating current (a.c.) transmission system components encompassing:
  - support structures and reasons for selection
  - insulators and reasons for selection
  - conductors and reasons for selection
  - vibration management systems and principles
  - line ratings based on voltage, span, tension and temperature
- a.c. transmission line models encompassing:
  - types of transmission line models based on line length
  - calculation of voltage drop, line regulation and transmission efficiency
  - load sharing between lines
- basic design features and characteristics of transmission structures and associated equipment and/or components encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing of poles/structures and associated equipment and or components
  - transmission systems principles – terminologies, primary and secondary, voltage levels and types of lines
  - characteristics of structure - types of structure (towers and poles, concrete and steel), characteristics of types of structures, installation methods and maintenance techniques
  - characteristics of associated equipment used on structures – insulators and earthing (overhead earth and communication lines).

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards,

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equipment specifications, regulations, codes of practice, network drawings, operational event data 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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UETTDRSO48 Respond to discrete and interdependent protection operations

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 coordination of response to discrete and interdependent protection operations due to system faults.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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 response to discrete/interdependent protection operations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of the switching program, are reviewed and determined
	1.2 Purpose of the response is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the response are obtained or established with appropriate personnel
	1.4 Response to discrete/interdependent protection operations are discussed with and/or directed to appropriate personnel in order to ascertain the scope of

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		the work/testing required
	1.5	Testing parameters are ascertained from established policies, procedures and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures
	1.12	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	1.13	Strategic plans are developed incorporating organisational initiatives in accordance with established procedures
2 Carry out response to discrete/interdependent protection operations	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Decisions concerning the response to protection operations are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments

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	2.4	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
	2.6	Testing of the decision to be implemented is undertaken according to requirements and established procedures
	2.7	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.8	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.9	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the response to discrete/interdependent protection operations	**3.1**	Final review of the switching program is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the work
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned
	3.3	Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of switching program documents (electronic/paper) are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO48A Respond to discrete and interdependent protection operations.

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 UETTDRSO48 Respond to discrete and interdependent protection operations

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 and evaluating, on at least three (3) occasions, all of the following:
  - identifying discrete/interdependent relay operations by interpreting available alarms and event data
  - analysing and diagnosing system failures
  - evaluating responses to discrete/interdependent relay operations
  - describing control and alarms associated with discrete/interdependent protection systems
- 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:

- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations

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- substations and power transformers encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers; operation under load/no-load conditions; types and basic operation of tap changing switches, including solid state types; and efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - characteristics of a reactors - description and purpose
- HV fault switching principles encompassing:
  - 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 encompassing – function and application
  - circuit condition requirements and switching considerations when paralleling and separating HV feeders
- detailed operation and setting of 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
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
  - pilot wire and 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
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking.

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, personal protective equipment (PPE), relevant modelling tools, and computerised electrical plant control and monitoring facilities currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, drawings, 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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UETTDRSO49 Coordinate power system operations in a regulated energy market

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 coordination of system operations in a regulated energy market. It includes the relevant application of knowledge of the National Electricity Market (NEM), the practices and rules used in facilitating the coordination of operations in a regulated energy market.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

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 coordinate system operations in a regulated energy market	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the coordination of the electricity market, are reviewed and determined
	1.2 Energy market requirements are established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Energy market and associated equipment operational prerequisites are identified and established in accordance with manufacturer and/or enterprise/site procedures

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	1.4 Electricity market coordination and control procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are ascertained from established policies, procedures and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Need for relevant work permits is identified to coordinate the performance of work according to requirements and/or established procedures
	1.12 Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
2 Coordinate system operations in a regulated energy market	**2.1** Strategic plans are developed incorporating organisational initiatives in accordance with established procedures
	2.2 WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 Decisions concerning coordination are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Stakeholders/customers are kept informed of current status regarding plan progress and recent developments

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	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
	2.7	Testing of the decision to be implemented is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the coordination of system operations in a regulated energy market	**3.1**	Final review of the coordination is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the work
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned
	3.3	Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of coordination documents (electronic/paper) are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRSO49A Coordinate power system operations in a regulated energy market.

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 UETTDRSO49 Coordinate power system operations in a regulated energy market

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 on at least three (3) occasions the following:
  - dispatching energy to the electricity market
  - responding to electricity market fluctuations/demands
  - manipulating the system to ensure reliable operation in response to electricity market requirements
- demonstrating knowledge of all the following:
  - principals and objectives of the electricity market
  - the role of ancillary services in the operation of the electricity market
  - service provider obligations in the electricity market
  - connection and access requirements to the electricity market
  - analysis of pricing concepts
  - contractual obligations
  - scheduling of generation assets
- 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:

- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings

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    - the purpose and features of typical types of co-generation systems
- enterprise-specific policies and procedure instructions encompassing:
    - 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 procedures and work practices relating to managing network demand encompassing:
    - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
    - requirements for the use of demand management manuals, system diagrams/plans and drawings
    - identifying and interpreting enterprise demand management procedures
    - techniques in applying enterprise demand management 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, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, relevant modelling tools, drawings and operation manuals.

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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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UETTDRSO50 Respond to complex power system protection operations

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 coordination of response to complex protection operations due to system faults. It includes planning, carrying out and completing the response to complex protection operations.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO41 Manage power systems transmission networks

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

Generation/Distribution and Sub-transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO41 Manage power systems transmission networks

UETTDRSO42 Manage power systems transmission network demand

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

Unit Sector

Not applicable.

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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 response to complex protection operations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the preparation of response to complex protection operations, are reviewed and determined
	1.2 Purpose of the response is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established policies, procedures and specifications for the response are obtained or established with appropriate personnel
	1.4 Response to complex protection operations are discussed with and/or directed to appropriate personnel in order to ascertain the scope of the work/testing required
	1.5 Testing parameters are ascertained from established policies, procedures and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Need for relevant work permits is identified to coordinate the performance of work according to

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		requirements and/or established procedures
	1.12	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
2 Carry out response to complex protection operations	**2.1**	Strategic plans are developed incorporating organisational initiatives as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Decisions concerning the response to complex protection operations are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
	2.7	Testing of the decision to be implemented is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards

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3 Complete the response to complex protection operations	**3.1**	Final review of the response to complex protection operation is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete the work
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned
	3.3	Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the response to complex protection operation documents (electronic/paper) are issued and records are updated 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 UETTDRSO50A Respond to complex power system protection operations.

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 UETTDRSO50 Respond to complex power system protection operations

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 and evaluating, on at least three (3) occasions, all of the following:
  - identifying complex relay operations by interpreting available alarms and event data
  - analysing and diagnosing system failures
  - evaluating response to complex relay operations
- describing the following:
  - describing control and alarms associated with complex protection systems
- 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 system types 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, 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,

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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
- use of fault information to analyse and develop optimal network restoration strategies encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the analysis of protection targeting
  - requirements for the use of operational manuals, system diagrams/plans and drawings
  - techniques in the collation of protection data
  - techniques in the analyse and assessment of fault information – public, employee and protection equipment
  - application methods of fault information to analyse and develop optimal network restoration strategies - public and employee safety, and enterprise reliability guidelines
  - resource availability.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, relevant modelling tools, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, drawings and operation manuals.

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Links

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UETTDRSO51 Manage network systems power flows

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 management of electrical network active and reactive power flows ensuring the network is operated within design parameters at all times. The electrical network includes feeders from distribution to transmission voltages, substation and generation assets that can influence power flows.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRSO32 Manage power systems network faults

UETTDRSO41 Manage power systems transmission networks

UETTDRSO48 Respond to discrete and interdependent protection operations

UETTDRSO49 Coordinate power system operations in a regulated energy market

UETTDRSO50 Respond to complex power system protection operations

Generation/Distribution and Sub-transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Generation/Transmission Pathway Unit Group

UETTDRSO34 Control power systems generating plant

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO47 Coordinate high voltage transmission network

Distribution and Sub-transmission Pathway Unit Group

UETTDRSO35 Manage high voltage distribution and sub-transmission network demand

UETTDRSO37 Develop high voltage distribution and sub-transmission switching programs

UETTDRSO40 Coordinate high voltage distribution and sub-transmission networks

Transmission Pathway Unit Group

UETTDRSO38 Develop and evaluate power systems transmission switching programs

UETTDRSO41 Manage power systems transmission networks

UETTDRSO42 Manage power systems transmission network demand

UETTDRSO47 Coordinate high voltage transmission network

Competency Field

System Operations

Unit Sector

Not applicable.

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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 manage network power flows	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence preparation of any network power flow management decisions, are reviewed and determined
	1.2 Purpose of the management is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established policies, procedures and specifications for the management of network power flows are obtained or established with appropriate personnel
	1.4 Network power flow management decisions are discussed with and/or directed to appropriate personnel in order to ascertain the system conditions
	1.5 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.6 Work roles and tasks are allocated according to requirements and individual competencies
	1.7 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.8 Liaison and communication issues with others/authorised personnel, authorities and clients are resolved and activities coordinated to carry out work
	1.9 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.10 Need for relevant operating procedures are identified to manage the performance of the network according to requirements and/or established procedures

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	1.11 Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
2 Carry out and management network power flow	**2.1** Strategic plans are developed incorporating organisational initiatives in accordance with established procedures
	2.2 WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 Management decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Stakeholders/customers are kept informed of current status regarding plan progress and recent developments
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the work within an agreed timeframe according to requirements
	2.7 Testing of management decisions is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the management of network power flow	**3.1** Final review of management decisions is undertaken to ensure it complies with all requirements and includes all specifications and documentations needed to complete

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the work

3.2 Appropriate personnel are notified of completion and reports and/or completion documents (electronic/paper) are finalised/commissioned

3.3 Reports and/or completion documents (electronic/paper) are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Where applicable, approved copies of power flow management documents (electronic/paper) are issued and records are updated 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 UETTDRSO51A Manage network systems power flows.

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 UETTDRSO51 Manage network systems power flows

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 and evaluating, on at least three (3) occasions, network manipulations that encompass the following:
  - maximising system reliability
  - managing voltage
  - minimising loss
  - controlling load
  - dispatching of static/synchronous Volt Ampere Reactive (VAR) compensation (if applicable to enterprise)
  - dispatching of generation (if applicable to enterprise)
- applying calculations and analysing the following:
  - transmission line conditions on the interconnected extra high voltage (EHV) system
  - distribution and sub-transmission line conditions on an interconnected system
- 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:

- enterprise-specific procedures and work practices relating to managing network demand encompassing:
  - Commonwealth/state/territory and local government legislation, supply authority regulations, standards, codes and/or enterprise requirements applicable to the procedures and work practices relating to managing network demand
  - requirements for the use of network demand management manuals, system diagrams/plans and drawings

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  - identifying and interpreting enterprise demand management procedures
  - techniques in applying enterprise demand management procedures
- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of high voltage (HV) and 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 changer (OLTC) transformers; and static VAR compensators (SVC), such as SVC saturated reactor compensators, thyristor controlled reactor compensators and combined systems
  - production of harmonics and methods of harmonic control
  - location of voltage control devices within the system
- power flow control encompassing:
  - use of system components to control power flow patterns - base load, spinning reserve, regulating machines, rapid start plant, phase shifting transformers and load shedding
  - principles of automated control
  - synchronising power
  - relationship of power and frequency
  - machine stabilisation techniques
  - system oscillations and stability - damped and undamped oscillation, relationship of fault clearance times and system stability, and critical clearance times
- alternator operation and control encompassing:
  - constructional features of alternators - weights, lengths, lengths, cooling mediums, cooling systems, prime mover types, prime mover attachment, types of windings and core arrangements
  - principle of operation - induction machines and synchronous machines
  - modes of operation - island and infinite bus operation, running up of prime movers, loading the alternator, requirements for synchronising and methods of synchronising
  - use of reactive capability diagram - related diagram types, current circle diagram, performance chart, capability diagram, values represented, per unit representation, and limits representation and meaning
  - automatic voltage regulators - need for voltage control, required attributes of an AVR, range, response time, constraints on AVR capability, desirable attributes of an AVR, power consumption, compensation, rotor stabilisation, automatic changeover systems, and input and output requirements and components
  - operation on an infinite bus - definition of infinite bus, power/angle dependence, reactive flow/voltage dependence, power/angle diagram, effect of saliency, transient conditions, practical and theoretical stability limits, voltage dependence of stability, control of reactive flow using AVR and generator transformer tap changer
- EHV generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working

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policies, practices and procedures; and synchronising procedures
- techniques in the installation of generator set control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
- operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
- EHV generator set and control system to EHV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, modelling tools, computerised electrical plant control and monitoring facilities, and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice, relevant drawings, 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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UETTDRTP22 Establish and reinstate a power systems transmission structure work site

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 operation/maintenance of support plant and equipment and tools used for excavation work associated with foundations and footings for the construction of transmission towers. It also covers the preparation of the worksite and the reinstatement of the ground surface. Scope of maintenance includes visual inspection, lubrication, gland nipping, draining of water taps, degreasing and replacing gaskets. Use of relevant personal protective equipment (PPE) is also required.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

Competency Field

Transmission

Unit Sector

Not applicable.

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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 establish and/or restore a transmission tower worksite schedule of work	**1.1** Work instructions are identified, received and confirmed
	1.2 Relevant requirements, specifications and priorities are set in accordance with procedures to establish and confirm the work schedule
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist with the establishing/restoration of the worksite are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and emergency exits kept clear according to given instructions and established procedures
	1.6 Scope of responsibility under the relevant work permit, where appropriate, are received and confirmed with relevant personnel according to requirements and established procedures
	1.7 Resources, including equipment, tools, drawings, notices and PPE, required for the job are identified and checked for working order according to established procedures
	1.8 Relevant responsibilities associated with first aid and other related work safety procedures at the worksite are checked and confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9 Client issues are referred to appropriate personnel in accordance with industry//community standards
	1.10 Site preparation is confirmed according to given instructions, as is the site safety plan and the work schedule for a quality outcome and to minimise risk and damage to property, commerce and individuals in

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		accordance with established procedures
	1.11	Road signs, barriers and warning devices are correctly positioned in accordance with given instructions and requirements
2 Establish and/or restore the worksite schedule of work	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste associated with establishing/restoring the worksite and/or using of plant and equipment are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Site hazards, such as lifting, climbing, working in confined spaces and/or aloft, and use of power tools/equipment, techniques and practices, are safely followed in accordance with given instructions and according to requirements
	2.3	Operational knowledge for establishing/restoration of the worksite and for operating support plant and equipment is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	Establishing/restoring the worksite and operating support plant and equipment is used safely and carried out in accordance with given instructions and established procedures to ensure all process aspects of the work are confirmed
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.6	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.7	Problems associated with establishing/restoring the worksite and the operation of support plant and equipment are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
	2.8	Ongoing checks of quality of the work are undertaken

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		and work is completed within an allocated timeframe in accordance with given instructions and established procedures
3 Review and document establishment and/or restoration of worksite schedule of work	**3.1**	Work undertaken is checked against work schedule and anomalies reported to authorised persons in accordance with established procedures
	3.2	Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Appropriate personnel are notified of work completion according to established procedures
	3.6	Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and established procedures
	3.7	Performance feedback is sought to confirm outcomes are in agreement with work requirements and 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 Companion Volume Implementation Guide.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP22A Establish and reinstate a power systems transmission structure work site.

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 UETTDRTP22 Establish and reinstate a power systems transmission structure work site

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
- using plans, drawings, maps/work schedules to define work to be completed, indicating WHS/OHS and environmental issues/hazards
- verifying qualifications to operate machinery and perform machinery daily log checks
- submitting Dial Before You dig application forms
- verifying understanding of material safety data sheets (MSDS) and work permits
- undertaking appropriate traffic control management
- verifying an understanding of working safely with hazardous materials and equipment, safe manual handling techniques and correct use of personal protective equipment (PPE)
- operating safely at least five (5) of the following types of equipment/tools:
  - small generator sets
  - welding units
  - air compressors and hoses
  - pneumatic and/or electric hammers
  - rollers and compactors
  - concrete and ceramic cutters
  - pumps
  - post hole diggers
  - drills
- operating at least one (1) of the following pieces of equipment:
  - back hoes
  - earth drilling rigs
  - trench excavators
  - heavy vehicles
- 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:

- hand tools and their use encompassing:
  - hand tools for cutting, shaping, drilling, threading, tapping and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of hand tools
  - tools for measuring and marking out - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of hand tools
  - tools for dismantling and assembling electrical and electronic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of hand tools
- fixed and portable tools and their use encompassing:
  - fixed power tools for cutting, shaping, drilling and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of fixed power tools
  - portable power tools for cutting, shaping, drilling and structural components - 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, and requirements for use on construction sites
- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductibility, malleability, work hardening and annealing; and the conditions that lead to corrosion and the properties of timbers
- requirements for the use of enterprise vehicles, such as trucks and four-wheel drives encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with safe use of enterprise vehicles, including relevant certification and licensing, such as motor cars, light and heavy commercial trucks, heavy truck/trailer combination and four-wheel drive vehicles
  - compliance with regulations associated with the securing of loads prior for transportation
- requirements for the use of chainsaws, including relevant certification and licensing, encompassing:
  - safety precautions, requirements and responsibilities
  - selection and use of appropriate PPE
  - chainsaw operation - parts and function of components and ancillary equipment, pre-operational checks, starting procedures and safe use of chainsaw under load
  - safe transporting and storage 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 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, 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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UETTDRTP23 Erect power systems transmission structures

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 erection of towers, in sections or in parts, in accordance with construction plans and specifications. It includes the correct positioning of road signs, barriers and/or warning devices; the inspection and confirmation that excavation/foundation construction is in accordance with the work order; and the identification of potential hazards and safety risks with recommendations for preventative action being referred to appropriate authorities.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

Competency Field

Transmission

Unit Sector

Not applicable.

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 erect transmission towers	**1.1** Work instructions are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist in meeting erection of towers outcomes are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and emergency exits kept clear according to given instructions and established procedures
	1.6 Scope of responsibility under the relevant work permit are received and confirmed with relevant personnel according to requirements and established procedures
	1.7 Resources, including, equipment, tools and personnel protective equipment (PPE), required for the job are obtained and confirmed safe and in working order according to established procedures
	1.8 Relevant responsibility associated with first aid, tower/pole top rescue and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9 Client issues are referred to appropriate personnel in accordance with industry//community standards
	1.10 Site is prepared according to given instructions and the work schedule for a quality outcome and to minimise risk and damage to property, commerce and individuals in accordance and established procedures
	1.11 Road signs, barriers and warning devices are positioned in accordance with given instructions and requirements
2 Carry out the erection of	**2.1** WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and

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transmission towers		minimise waste are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements confirmed to eliminate the prospects of incidents
	2.3	Operational knowledge for the operation of support plant and equipment used for the erection of towers to be applied to the work is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	Operation of support plant and equipment used for the erection of towers is carried out in accordance with given instructions and established routines/procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.6	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.7	Problems associated with operation of support plant and equipment used for the erection of towers are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
	2.8	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete the erection of transmission towers	**3.1**	Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures
	3.2	Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with given instructions and established

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procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Appropriate personnel are notified of work completion according to established procedures

3.6 Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDRTP23A Erect power systems transmission structures.

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 UETTDRTP23 Erect power systems transmission structures

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
- erecting at least one (1) of the following transmission structure types:
  - pyramid
  - delta
  - pi
  - enterprise-specific types
- installing at least one (1) of the following foundation types:
  - mass concrete
  - caisson or pile-based
  - screw-anchor
  - bored
- using at least one (1) of the following methods of erecting a transmission structure:
  - crane
  - gin pole
- 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:

- hand tools and their use encompassing:
  - hand tools for cutting, shaping, drilling, threading, tapping and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of hand tools

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  - tools for measuring and marking out - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of hand tools
  - tools for dismantling and assembling electrical and electronic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of hand tools
- fixed and portable tools and their use encompassing:
  - fixed power tools for cutting, shaping, drilling and finishing metallic and non-metallic components - types of tools and their purpose, techniques for the correct and safe use of these tools, hazards associated with their use, and care and maintenance of fixed power tools
  - portable power tools for cutting, shaping, drilling and structural components - 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, and requirements for use on construction sites
- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductibility, malleability, work hardening and annealing; and the conditions that lead to corrosion and the properties of timbers
- transmission structures and hardware encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - types of structures
  - types and function of associated hardware/equipment and insulators
  - types of conductors
  - location of transmissions structures
  - other equipment used on transmission structures, e.g. aircraft warning devices
  - voltages on transmission structures
- enterprise-specific technical drawings and documents encompassing:
  - 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must 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 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, equipment and personal protective equipment currently (PPE) used in industry to erect power systems transmission structures
- 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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UETTDRTP24 Erect power systems transmission structure hardware

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 erection of hardware and/or associated equipment used on transmission towers. It includes the correct positioning of hardware on the towers in accordance with construction plans and specifications. It also encompasses the inspection and confirmation that the hardware and associated equipment are in accordance with the works order and the identification of potential hazards and safety risks with recommendations for preventative action being referred to appropriate authorities.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDRTP23 Erect power systems transmission structures

Competency Field

Transmission

Unit Sector

Not applicable.

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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 erect transmission tower hardware	**1.1** Work instructions are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist in meeting the erection of transmission tower hardware outcomes are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and emergency exits kept clear according to given instructions and established procedures
	1.6 Scope of responsibility under the relevant work permit are received and confirmed with relevant personnel according to requirements and established procedures
	1.7 Resources, including, equipment, tools and personnel protective equipment (PPE), required for the job are obtained and, in working order according to established procedures
	1.8 Relevant responsibility associated with first aid, tower/pole top rescue and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9 Client issues are referred to appropriate personnel in accordance with industry//community standards
	1.10 Site is prepared according to given instructions and the work schedule for a quality outcome and to minimise risk and damage to property, commerce and individuals

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		in accordance and established procedures
	1.11	Road signs, barriers and warning devices are positioned in accordance with given instructions and requirements
2 Carry out the erection of transmission tower hardware	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Lifting, climbing, working in confined spaces and/or aloft, and use of power tools/equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements to eliminate the prospects of incidents
	2.3	Operational knowledge for the erection of transmission tower hardware to be applied to the work is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	The erection of transmission tower hardware is carried out in accordance with given instructions and established routines/procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.6	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.7	Problems associated with the erection of transmission tower hardware are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
	2.8	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete the erection of transmission tower hardware	**3.1**	Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures

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3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Appropriate personnel are notified of work completion according to established procedures

3.6 Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDRTP24A Erect power systems transmission structure hardware.

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 UETTDRTP24 Erect power systems transmission structure hardware

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
- erecting hardware on at least one (1) of the following structures:
  - pyramid
  - delta
  - pi
  - enterprise-specific types
- erecting at least one (1) of the following pieces of hardware:
  - insulators
  - bolts
  - clamps
- erecting transmission hardware using at least one (1) of the following methods:
  - crane
  - gin pole
- 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:

- requirements for the use of enterprise vehicles, such as trucks and four-wheel drives, encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with safe use of enterprise vehicles, including relevant certification and licensing, such as motor cars, light and heavy commercial trucks, heavy truck/trailer combination and four-wheel drive vehicles

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    - compliance with regulations associated with the securing of loads prior to transportation
- generation systems encompassing:
    - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
    - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
    - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
    - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
    - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems; and radial, parallel and ring main feeders
    - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
    - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders; and the high voltage (HV) equipment associated with substations.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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

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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UETTDRTP25 Pre-tension stringing overhead transmission conductors and cables

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 stringing of overhead conductors and cables with no electrical connections being made. It includes the preparation of the site, the pre-positioning of conductors and fitting of conductor/cable stringing equipment, where appropriate, and the cleaning of insulators in accordance with work orders.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDRTP23 Erect power systems transmission structures

UETTDRTP24 Erect power systems transmission structure hardware

Competency Field

Transmission

Unit Sector

Not applicable.

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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 pre-tension string the transmission overhead conductors and cables	**1.1** Work instructions are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist in meeting pre-tension stringing of transmission overhead conductors and cables outcomes are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks assessed and emergency exits kept clear according to given instructions and established procedures
	1.6 Scope of responsibility under the relevant work permit are received and confirmed with relevant personnel according to requirements and established procedures
	1.7 Resources, including, equipment, tools and personnel protective equipment (PPE), required for the job are obtained and in working order according to established procedures
	1.8 Relevant responsibility associated with first aid, tower/pole top rescue and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9 Client issues are referred to appropriate personnel in accordance with industry//community standards
	1.10 Site is prepared according to given instructions and the work schedule for a quality outcome and to minimise

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		risk and damage to property, commerce and individuals in accordance and established procedures
	1.11	Road signs, barriers and other warning devices are positioned in accordance with given instructions and requirements
2 Carry out pre-tension stringing of transmission overhead conductors and cables	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements
	2.3	Operational knowledge for the pre-tension stringing of transmission overhead conductors and cables to be applied to the work is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	Pre-tension stringing of transmission overhead conductors and cables is carried out in accordance with given instructions and established routines/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 according to established procedures
	2.6	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.7	Problems associated with pre-tension stringing of transmission overhead conductors and cables are dealt with using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
	2.8	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete pre-tension stringing of transmission	**3.1**	Work undertaken is checked against work schedule and anomalies reported to authorised personnel in

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overhead conductors and cables	accordance with established procedures
	3.2 Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures
	3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5 Appropriate personnel are notified of work completion according to established procedures
	3.6 Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDRTP25A Pre-tension stringing overhead transmission conductors and cables.

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 UETTDRTP25 Pre-tension stringing overhead transmission conductors and cables

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 stringing with at least two (2) of the following conductor types:
  - copper
  - aluminium
  - steel
  - aluminium/steel reinforced
  - high voltage (HV) ABC
  - High Voltage Insulated Unscreened Conductor (HV IUC)
- performing pre-tension stringing of overhead transmission conductors and cables using any one (1) of the following types of equipment:
  - elevated work platform (EWP)
  - winches/capstans
  - tension equipment
  - stringing equipment
  - cable trailers
  - cable drum stands
  - ropes
  - rollers
  - sheaves
  - stockings
  - swivels
- 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:

- stringing installation overhead transmission conductors and cables encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to stringing conductors and cables
  - requirements for the use of overhead line construction manuals, system diagrams/plans and drawings, and material lists
  - conductor size, type and route length
  - constructions types and structures for transmission lines
  - types, sizes and characterises of overhead conductors
  - resources for the stringing of conductors, - personal protective equipment (PPE), plant, tools and equipment
  - techniques in stringing conductors - safe working practices, method of conductor support, consideration for the environment, location/positioning of the conductor/cable, types and application of tools, and equipment and hardware
  - methods of stringing 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
- 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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UETTDRTP26 Install transmission structures and associated hardware

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 transmission structures and associated hardware in the electricity supply industry (ESI).

It includes preparing to install and installing transmission structures, and associated hardware in accordance with construction plans, drawings and workplace procedures. It also includes updating system data, records and completing relevant documentation.

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

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Transmission

Unit Sector

Not applicable.

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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 transmission structures and associated hardware	**1.1** Works schedule, construction 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 erecting towers and associated hardware 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 are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed 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 the erection of transmission towers and associated hardware	**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

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		followed in accordance with workplace procedures
	2.3	Transmission structures and associated hardware are assembled at ground level and erected in accordance with construction plans, drawings and workplace procedures
	2.4	Structure is stabilised in accordance with construction plans, drawings and workplace procedures
	2.5	Unplanned events are responded to in accordance with workplace procedures
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation of transmission structures and associated hardware	**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 and towers and associated hardware are 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.

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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 UETTDRTP26A Install transmission structures and associated hardware.

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 UETTDRTP26 Install transmission structures and associated hardware

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
- installing structures must include at least two (2) of the following types:
  - pyramid
  - delta pi
  - enterprise specific type
- installing hardware must include all of the following:
  - insulators
  - clamps
  - bolts
  - structural components
- performing stabilisation activities must include the following:
  - welding
  - cleaning
- 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:

- requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
- types of structures
- types and function of associated hardware/equipment and insulators
- types of conductors
- location of transmissions structures

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- other equipment used on transmission structures, e.g. aircraft warning devices
- voltages on transmission structures
- traffic management, such as:
  - purpose of traffic management and a power worker's responsibilities in accordance with relevant statutory requirements and electricity supply industry (ESI) requirements, the procedures used to provide an effective traffic management scheme and the use of a two-way radio
- classification and identification of equipment, components and tools
- procedures for purchasing/ordering items, removing/dispatching items, stocktaking and record keeping
- safe working practices, including:
  - requirements to enable safe working on conductive poles
  - safe working practices when working with associated hardware/equipment and insulators
  - precautions of voltages on transmission structures
  - safe working practices when using specialised 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 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 the installation of transmission structures and associated hardware
- 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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UETTDRTP27 Maintain transmission structures and associated hardware

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 maintenance of non-energised, pyramid, delta, Pi or enterprise-specific transmission towers and associated hardware. It includes the repair and/or replacement of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Maintenance also involves cleaning and welding. The updating of system data, records and/or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRTP26 Install transmission structures and associated hardware

Competency Field

Transmission

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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 maintain transmission towers and associated hardware	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the maintenance of towers and associated hardware are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.8 Relevant personnel at worksite are confirmed current in first aid, pole tower/top rescue and other related work procedures according to requirements

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	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary
	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures
	1.12 Traffic management plan is identified and implemented
2 Carry out the maintenance of transmission towers and associated hardware	**2.1** WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2 Towers and associated hardware to be maintained are stabilised according to requirements
	2.3 Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.4 Essential knowledge and associated skills are applied in the safe maintenance of towers and associated hardware to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5 Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.6 Maintenance, including repair and/or replacement of towers, is carried out in accordance with the work schedule and requirements/established procedures
	2.7 Unplanned events in the maintenance of towers and associated hardware are undertaken within the scope of established procedures
	2.8 Known solutions to a variety of problems are applied

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		using acquired essential knowledge and associated skills
	2.9	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the maintenance of transmission towers and associated hardware	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
	3.5	Relevant work permits are signed off and towers and associated hardware are returned to service in accordance with requirements
	3.6	Work completion records, reports, as installed//modified drawings and/or documentation and information are finalised and processed and appropriate 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 UETTDRTP27A Maintain transmission structures and associated hardware.

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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 UETTDRTP27 Maintain transmission structures and associated hardware

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 transmission structures including any one (1) of the following:
  - pyramid
  - delta pi
  - enterprise-specific type
- removing, repairing or replacing transmission associated hardware including at least two (2) of the following:
  - insulators
  - clamps
  - bolts
  - structural components
- undertaking maintenance of transmission structures and associated hardware including at least one (1) of the following:
  - welding
  - cleaning
- 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:

- procedures for gaining access permits
- reasons for gaining access
- types of maintenance procedures on transmission structures encompassing:
  - procedure to follow for inspection/patrols according to the transmission apply authority

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- erecting and removing of transmission equipment and hardware from a tower encompassing:
  - climbing procedures
  - square rigging principles
  - calculation of forces at work within a given square rigging system
  - construction of a square rigging system
  - procedures for changing insulators, such as:
    - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
- installation of temporary work platforms encompassing:
  - types and function of installation tools and equipment
  - precautions and work methods to follow
  - procedures for installations of temporary work platforms
- installation of conductor protective hardware encompassing:
  - types and selection of common dampers, tools and equipment
  - control of Aeolian vibration
  - procedures for the installation of dampers onto conductors
- dead line insulator washing encompassing:
  - supply authority regulations
  - procedure for washing de-energised transmission lines.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 maintaining transmission structures and associated hardware
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UETTDRTP28 Set-up and install transmission structure stubs

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 utilisation of geographical maps and site surveys to set out, excavate, prepare, align and install the foundation footings of a transmission tower and establish the tower stubs to ground level for the erection of transmission towers. Survey processes and operation of survey equipment is associated with this unit.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Transmission

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 for the setting of a transmission tower stub	**1.1**	Work schedule), including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3	Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for construction activities are obtained and confirmed for the purposes of the work to be performed and communicated
	1.4	Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear according to established procedures
	1.6	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.7	Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.8	Relevant personnel at worksite are confirmed current in first aid, rescue and other related work procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable,

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		in accordance with established procedures
	1.12	Traffic management plan is identified and implemented, where appropriate
2 Carry out the setting of a transmission tower stub	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.3	Lifting, climbing, working in excavations and use of power tools/equipment, techniques and practices are safely followed, and currency according to requirements confirmed
	2.4	Essential knowledge and associated skills are applied in the survey and establishment of tower stubs to ensure completion in an agreed timeframe, and to quality standards with a minimum of waste according to requirements
	2.5	Unplanned events in the establishment of tower stubs are undertaken within the scope of established procedures
	2.6	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.7	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the setting of a transmission tower stub	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and

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returned to storage or disposed of in accordance with established procedures

3.5 Relevant work permits are signed off, where appropriate, and equipment returned to service in accordance with requirements

3.6 Works completion records, reports, as installed/modified drawing and/or documentation and information are finalised and processed and appropriate 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 UETTDRTP28A Set-up and install transmission structure stubs.

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 UETTDRTP28 Set-up and install transmission structure stubs

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
- demonstrating all of the following:
  - survey techniques
  - setting out and pegging excavation markers
  - establishing the tower stub to ground level
- 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:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque and pressure
  - applications of the International System of Units (SI) units
  - the relationship between work, power and energy
  - behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
  - fundamentals of the basic laws of fluid mechanics

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- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications - properties of tensile strength, effects of temperature on the expansion of metals, ductibility, malleability, work hardening and annealing and the conditions that lead to corrosion and the properties of timbers
- operation of elevated work platform (EWP) encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with EWP, including relevant certification and licensing - safe working clearances; safe operation procedures and the mandatory wearing of harness/attachment requirements; safety observers; inspection and testing procedures prior to use, set-up, operation and shutdown procedures for an EWP
  - emergency procedures for an EWP - escape procedures for an EWP, rescuing procedures and mechanical failure procedures
  - types of EWP insulated/uninsulated
- operation and maintenance of mobile plant, tools and equipment encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with portable hydraulic equipment and portable pneumatic equipment, including relevant certification and licensing - safe working clearances, safe operation procedures and safety observers
  - inspection and testing procedures prior to use
  - set-up, operation and shutdown procedures
  - permit to work systems and isolation procedures
- requirements for the use of enterprise vehicles, such as trucks and four-wheel drive vehicles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with safe use of enterprise vehicles, including relevant certification and licensing, such as motor cars, light and heavy commercial trucks, heavy truck/trailer combination and four-wheel drive vehicles
  - compliance with regulations associated with the securing of loads prior to transportation
- requirements for the use of chainsaws, including relevant certification and licensing, encompassing:
  - safety precautions, requirements and responsibilities
  - selection and use of appropriate personal protective equipment (PPE)
  - chainsaw operation - parts and function of components and ancillary equipment, pre-operational checks, starting procedures and safe use of chainsaw under load
  - safe transporting and storage procedures
- procedure in providing store support encompassing:
  - classification and identification of equipment, components and tools
  - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
  - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks, forklifts and cable drum handling equipment
  - safety procedures - storage and care of safety equipment, handling hazardous materials,

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storage of hazardous substances and dangerous goods, and depot safety procedures
    - manufacturer and supplier information, including material safety data sheets (MSDS)
- filtering and sampling of insulating oil encompassing:
    - 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 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
- powerline safety practices encompassing:
    - 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, 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; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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
- environmental fundamentals encompassing:
    - environmental standards, codes, environmental legislation, supply authority regulations

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and/or enterprise requirements applicable to the control of environment associated with the worksite - relevant federal legislation, relevant state/territory legislation, relevant local government by-laws, relevant government or quasi government policies and regulations, and relevant community planning and development agreements (including land care agreements)
    - employer and employee responsibilities
    - methods of obtaining information on environmental issues and updates
    - methods of identifying environmental impacts from work-related activities
    - meaning of environmental terms - identification, assessment and control of risks, compliance, best practice and sustainable energy
    - procedures in implementing management plans to ensure compliance
- material handling and the environment encompassing:
    - 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; and applicable environmental care when handling materials, including provision of manufacturer and supplier information, such as 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 loading crane, chainsaws, 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
- principles of surveying encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to surveying in the ESI
    - survey principles and measurement of ground levels, deviation angles and compass bearings
    - basic survey of short distribution line extension.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, 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

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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UETTDRTP29 Install and maintain transmission overhead conductors and cables

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 transmission overhead conductors and cables in the electricity supply industry (ESI).

It includes installing and maintaining overhead conductors and cables used on towers including stringing, tensioning and terminating of conductor/cable while de-energised, securing conductor to the insulators or supports and performing the electrical connections. It also includes maintenance work associated with phasing, completing workplace tests, isolating systems and circuits, accepting/issuing electrical permits and updating of system data/maintenance records.

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

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

UEENEEE105A Fix and secure electrotechnology equipment

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRTP26 Install transmission structures and associated hardware

UETTDRTP27 Maintain transmission structures and associated hardware

Competency Field

Transmission

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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 for installation and maintenance of overhead conductors and cables used on towers	**1.1** Work schedules, construction 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 the installation and maintenance of overhead conductors and cables used on towers 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 are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed 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

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2 Carry out installation and maintenance of overhead conductors and cables used on towers	**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	Systems and circuits are isolated and proved safe to work in accordance with job requirements, work permits and workplace procedures
	2.4	Installation and maintenance of overhead conductors and cables are completed in agreed timeframes, to quality standards and with minimum waste in accordance with requirements
	2.5	Overhead conductor/cables are strung, tensioned and terminated in accordance with workplace procedures
	2.6	Conductors, anti-vibration devices and spaces/spreaders are secured in accordance with workplace procedures
	2.7	Electrical connections are made in accordance with the workplace procedures
	2.8	Maintenance, including repair and/or replacement of overhead conductors and cables, is performed in accordance with workplace procedures
	2.9	Unplanned events are responded to in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete installation and maintenance of overhead conductors and cables used on towers	**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

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are, where appropriate, cleaned, checked and returned to storage in accordance with workplace procedures

3.5 Relevant work permits are signed off and overhead conductors and cables used on towers are 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 UETTDRTP29A Install and maintain transmission overhead conductors and cables.

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 UETTDRTP29 Install and maintain transmission overhead conductors and cables

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
- using at least one (1) of the following:
  - copper
  - aluminium
  - steel
  - composite
  - aluminium/steel reinforced
  - pilot
- operating from at least two (2) of the following:
  - elevated work platform (EWP)
  - portable platform
  - gondola
  - hook ladder*
  - elevated work box (EWB)
  - (*must do)
- using at least five (5) of the following:
  - winches*
  - tension equipment*
  - stringing equipment
  - cable trailers
  - crimping equipment *
  - pre-formed splices
  - hardware
  - cable drum stands

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  - ropes
  - rollers/ sheaves
  - comealongs
  - swivels
  - (*must do)
- using at least two (2) of the following:
  - voltage/de-energised indicating device
  - field intensity meter
  - operating rods
  - (*must do)
- using at least one (1) of the following:
  - dynamometer
  - site board
  - abney level
  - sag chart*
  - theodolite
  - (*must do)
- 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:

- limits of approach for personnel, vehicles, mobile plant and (EWP)
- requirements of persons prior to making bare hand contact with dead low voltage (LV)mains and apparatus
- requirements of relevant electrical access permits necessary to allow work to be performed on LV and high voltage (HV)apparatus
- safe working practices, including:
  - requirements to enable safe working on conductive poles
  - procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit
  - safe working practices when working with associated hardware/equipment and insulators
  - precautions of voltages on transmission structures
  - dangers when working at heights
  - identification of hazards, assessing and controlling risks
  - types, selection, maintenance and uses of personnel protective equipment (PPE)
  - permit to work systems and isolation procedures
  - safe working practices when using specialised equipment
  - emergency response and rescue procedures, including first.

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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 PPE currently used in industry for installing and maintaining transmission overhead conductors and cables
- 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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UETTDRTP30 Inspect transmission overhead structures and electrical 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 the inspection requirements of overhead structures, such as towers and electrical apparatus. Overhead structures include towers and overhead conductors and/or cables, including underground and overhead transition points, electrical equipment, hardware and/or earthing systems. It also includes the completion of inspection reports and other relevant documentation in accordance with requirements.

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

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

Competency Field

Transmission

Unit Sector

Not applicable.

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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 the inspection of overhead structures and electrical apparatus used on towers	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the inspection of overhead structures and electrical apparatus used on towers are obtained and understood for the purposes of the work to be performed
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and obtained and confirmed safe and in working order
	1.8 Relevant personnel at worksite are confirmed current in first aid, tower/pole top rescue and other related work procedures according to requirements
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work

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	1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures
	1.12 Traffic management plan is identified and implemented
2 Carry out inspection of overhead structures and electrical apparatus used on towers	**2.1** WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2 Lifting, climbing, working in confined spaces and aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.3 Essential knowledge and associated kills are applied in the safe inspection of overhead structures and electrical apparatus used on towers to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.4 Inspection of overhead structures and electrical apparatus used on towers is carried out in accordance with the work schedule and requirements/established 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 according to established procedures
	2.6 Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.7 Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the inspection of overhead structures and electrical apparatus used on towers	**3.1** Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures

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3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures

3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits are signed off and overhead structures and electrical apparatus used on towers are returned to service in accordance with requirements

3.6 Work completion records, reports, as installed//modified drawings and/or documentation and information are finalised and processed and appropriate 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 UETTDRTP30A Inspect transmission overhead structures and electrical 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 UETTDRTP30 Inspect transmission overhead structures and electrical 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
- undertaking inspections of poles – structures and electrical apparatus including at least three (3) of the following inspection methods:
  - towers
  - overhead conductors/cables
  - structural fittings
  - electrical equipment
  - hardware
  - earthing systems
- undertaking inspections using at least two (2) of the following:
  - visual*
  - infra-red camera
  - X-ray
  - camera
  - binoculars/telescope
  - (* must do)
- complying with all of the following:
  - reporting procedures
  - reporting outcomes
- 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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- standards, codes, legislation, supply authority regulations and/or enterprise requirements
- characteristics of materials used for transmission structures within the electrical transmission system encompassing:
  - faults that occur that influence the integrity of the structure
- deterioration of assets encompassing:
  - relationship between steel, concrete and other materials
  - deterioration in steel and concrete
  - inspection procedures for deterioration
- clearances and safety procedures
- ground line inspection procedures of electrical transmission lines encompassing:
  - requirements for inspection of transmission lines and insulators
  - use of specific equipment during inspection
  - techniques in transmission line inspection
- overhead line inspection procedures of electrical transmission lines encompassing:
  - methods and requirements for overhead line inspection on electrical structures
  - clearances for overhead conductors, cables and structures
  - techniques used to obtain close inspection of transmission lines
  - use of specific equipment and testing inspection
  - methods of recording data.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 inspecting transmission overhead structures and electrical apparatus
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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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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UETTDRTP31 Maintain energised transmission lines using high voltage live work stick method

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 energised transmission lines using high voltage (HV) live work stick method in the electricity supply industry (ESI).

It includes maintaining live work using stick techniques, including verifying site conditions and potential hazards, the conformation and calculation of physical loads and selecting appropriate and authorised work methods. It also includes preparing and cleaning of specialist materials and tools in accordance with authorised technical instructions, undertaking occupational health and safety (WHS)/occupational health and safety (OHS), safe working practices, rendering inoperative the automatic re-closing device including its restoration in accordance with work plan, and procedures for issuing/accepting live work authorities/permits and/or relevant work documentation.

The application of the skills and knowledge described in this unit may require a licence to operate specific pieces of equipment such as elevated work platforms.

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 one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Certificate III Transmission overhead powerline worker or a qualified transmission powerline worker.

Pathway 2

BSBLDR403 Lead team effectiveness

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

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UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRIS65 Contribute to coordinated HV live working

UETTDRTP26 Install transmission structures and associated hardware

UETTDRTP27 Maintain transmission structures and associated hardware

UETTDRTP29 Install and maintain transmission overhead conductors and cables

UETTDRTP30 Inspect transmission overhead structures and electrical apparatus

UETTDRTP99 Test and verify transmission overhead installations

Competency Field

Transmission

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 energised transmission lines using HV live work stick method	**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, WHS/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

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		acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised and evaluated against the work schedule
	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	Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR) and other rescue procedures in accordance with job requirements and/or workplace procedures
	1.9	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to perform work, as required
	1.10	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.12	Traffic management is planned and implemented in accordance with workplace procedures
2 Carry out the maintenance of energised transmission lines using HV live work stick method	**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	First aid, CPR and other rescue procedures are performed in accordance with job requirements and/or workplace procedures
	2.3	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to

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		immediate authorised personnel for directions in accordance with established procedures
	2.5	Auto-reclose devices and associated circuits are rendered inoperative and necessary work documentation obtained in accordance with workplace procedures
	2.6	Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures
	2.7	Maintenance of energised HV overhead electrical transmission apparatus is performed in accordance with work schedules, job requirements and workplace procedures
	2.8	Energised HV overhead electrical transmission apparatus is maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.9	Solutions to non-routine problems are identified and actioned in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the maintenance of energised transmission lines using HV live work stick method	**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 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	Relevant work permits are signed off and client/customer advised in accordance with workplace procedures
	3.6	Work records, reports and/or documentation 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP31A Maintain energised transmission lines using high voltage live work stick method.

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 UETTDRTP31 Maintain energised transmission lines using high voltage live work stick method

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
- accessing work zone using at least two (2) of the following methods:
  - ladder access
  - elevated work platform (EWP) access
  - elevated work box (EWB) access
  - structure access
- completing all the following:
  - electrical integrity of insulators
  - replacing strain insulators
  - replacing suspension insulators
- performing at least three (3) of the following live work tasks:
  - replacing/installing vibration dampers
  - repairing/replacing conductor spacers
  - repairing/replacing conductor fittings and hardware
  - applying pre-formed helical fittings
  - installing/removing vibration meters
  - replacing cross-arms
  - replacing poles
- 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:

- Commonwealth/state/territory legislation, standards, codes, supply authority regulations

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and/or enterprise requirements associated with working on energised lines for voltages from 66 kV up to 500 kV utilising live work stick method

- relationship and responsibilities of each team member encompassing:
  - roles of the individual in the team
  - contribution to joint outcomes
  - goals/plans and objectives of the team
  - team communication
  - effective teamwork
- safety precautions for working on energised lines encompassing:
  - live work minimum approach distances for persons and plant
  - calculation of forces supported by live working equipment
  - identification of WHS/OHS hazards, and assessing and controlling risks
  - types, selection, maintenance, storage and uses of personnel protective equipment (PPE) required for live stick work
  - types and functions, safe working policies, procedures and practices for use of specialised live work plant, equipment and tools
  - emergency response and rescue procedures
- electrical and electrostatic principles encompassing:
  - relationship of the resistance of a human body to different levels of current and voltage
  - relationship of a human body to an electric field
  - effects of electrostatic induction for live stick work
  - relationship of phase voltage and respective line voltages
  - effect of distance
  - potential of an object within the field and the effect of distances to the potential
- high voltage (HV) feeder auto-reclosing suppression encompassing:
  - function
  - application
  - live work access authority/permit systems
- selection care, use and maintenance of sticks for live work encompassing:
  - care of live work sticks
  - use and load limitations of live work sticks
  - cleaning live work sticks
  - restoring gloss surfaces of live work sticks
  - repairing small ruptures of live work sticks
  - repairing broken fittings of live work sticks
- selection, care, use and maintenance of ropes for live work encompassing:
  - identification of ropes used for live stick work
  - characteristics
  - types
  - application

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  - restrictions
  - storage
  - transport
  - cleaning
  - labelling
  - testing
  - recording
  - techniques in splicing
  - determining suitability of the rope for continued use
- live stick work techniques performed in accordance with enterprise requirements encompassing:
  - connecting and/or disconnecting HV bypass bridges
  - erecting and using boom pole and insulator cradle
  - erecting and/or replacing structures and poles
  - installing and/or replacing HV cross-arms
  - installing and/or replacing HV suspension insulators
  - installing and/or replacing HV strain insulators
  - installing and/or replacing suspension clamp unit
  - installing and/or replacing fittings and hardware to conductors
  - installing and/or replacing vibration dampers
  - installing and/or replacing preformed repair rods
- checking electrical integrity of insulators prior to work encompassing:
  - visual and audible assessment
  - test for disc voltage difference
  - plot data
  - assess data
  - determining condition of an insulator string
- rigging procedures for live work encompassing
  - identification of rigging points on structures
  - selection and positioning of rigging equipment on structures
  - selection and operation of rope tackles
- safety observer principles and responsibilities encompassing:
  - areas of responsibility
  - supervisor skills
  - protocols and procedures
  - specific duties of a safety observer
  - techniques in observing others in the safe performance of their work
  - minimum approach distances for personnel and hand-held tools
  - special limits of approach.

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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, 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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UETTDRTP32 Maintain energised transmission lines using high voltage live work bare hand method

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 energised transmission lines using high voltage (HV) live work Barehand method in the electricity supply industry (ESI).

It includes maintaining. live work using Barehand method, verifying site conditions and potential hazards, conformation and calculation of physical loads and selection of appropriate and authorised work methods. It also includes preparing and cleaning specialist material and tools in accordance with authorised technical instructions, undertaking of work health and safety (WHS)/occupational health safety (OHS), safe working practices and rendering inoperative the automatic re-closing device including its restoration in accordance with the work plan and procedures for issuing/accepting live work authorities/permits and/or relevant work documents.

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 one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Transmission Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

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

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UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRIS65 Contribute to coordinated HV live working

UETTDRTP26 Install transmission structures and associated hardware

UETTDRTP27 Maintain transmission structures and associated hardware

UETTDRTP29 Install and maintain transmission overhead conductors and cables

UETTDRTP30 Inspect transmission overhead structures and electrical apparatus

UETTDRTP31 Maintain energised transmission lines using high voltage live work stick method

UETTDRTP99 Test and verify transmission overhead installations

Competency Field

Transmission

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 maintain energised transmission lines using HV live work bare hand method	**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, WHS/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

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		acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.5	Risk control measures are identified, prioritised and evaluated against the work schedule
	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	Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR) and other rescue procedures in accordance with job requirements and/or workplace procedures
	1.9	Liaison and communication issues with authorised personnel, authorities, clients and land owners are resolved to perform work, as required
	1.10	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11	Personnel participating in work are fully briefed and responsibilities confirmed in accordance with workplace procedures
	1.12	Traffic management is planned and implemented in accordance with workplace procedures
2 Perform maintenance of transmission lines using HV live work bare hand method	**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	First aid, CPR and other rescue procedures are performed in accordance with job requirements and/or workplace procedures
	2.3	Requirements for lifting, climbing, working at heights, confined spaces and use of power tools/equipment are followed in accordance with workplace procedures
	2.4	Auto-reclose devices and associated circuits are rendered inoperative and necessary work documentation

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		obtained 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	Remedial actions are taken to overcome shortfalls encountered in the work schedule in accordance with job requirements and workplace procedures
	2.7	Maintenance of energised HV overhead electrical transmission apparatus is performed in accordance with work schedules, job requirements and workplace procedures
	2.8	Energised HV overhead electrical transmission apparatus is maintained to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.9	Solutions to non-routine problems are identified and actioned using in accordance with workplace procedures
	2.10	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the maintenance of transmission lines using HV live work bare hand method	**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	Accidents and/or injuries are reported and followed up in accordance with requirements/workplace procedures
	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	Relevant work permits are signed off and client/customer advised in accordance with workplace procedures
	3.6	Work records, reports and/or documentation 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP32A Maintain energised transmission lines using high voltage live work Barehand method.

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 UETTDRTP32 Maintain energised transmission lines using high voltage live work bare hand method

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
- accessing work zone using at least one (1) of the following methods:
  - ladder access
  - elevated work platform (EWP) access
  - elevated work box (EWB) access
  - rope access
- performing at least five (5) of the following live work tasks:
  - replacing strain insulators
  - replacing suspension insulators
  - replacing/connecting bridge/bonding connections
  - replacing vibration dampers
  - repairing/replacing conductor spacers
  - repairing/replacing conductor joints
  - repairing conductors
- 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:

- Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on energised lines for voltages up to and including 500 kV utilising the live bare hand work method
- relationship and responsibilities of each team member, including:
  - role of the individual in the team

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  - contribution to joint outcomes
  - goals/plans and objectives of the team
  - work team communication
  - effective teamwork
- safety precautions for working on energised lines, including:
  - live work minimum approach distances for persons and plant
  - calculation of forces supported by live working equipment
  - identification of WHS/OHS hazards, and assessing and controlling the risks
  - types, selection, maintenance, storage and uses of personnel protective equipment (PPE), including the faraday suit
  - types and functions, safe working policies, procedures and practices for use of specialised live work plant, equipment and tools
  - emergency response and rescue procedures
- electrical and electrostatic principles, including:
  - relationship of the resistance of a human body to different levels of current and voltage
  - relationship of a human body in an electric field
  - effects of electrostatic induction for live bare hand work
  - relationship of phase voltage and respective line voltages
  - effect of distance to voltage
  - potential of a conductive object within a field
- high voltage (HV) feeder auto-reclosing suppression, including:
  - function
  - application
  - live work access authority/permit systems
- live bare hand work techniques performed in accordance with enterprise requirements, including:
  - fitting and testing a faraday suit
  - erecting and using an insulated ladder
  - erecting and using a boom pole and insulator cradle
  - installing and/or replacing HV suspension insulators
  - installing and/or replacing HV strain insulators
  - installing and/or replacing suspension clamp units
  - installing and/or replacing fittings and hardware to conductors
  - installing and/or replacing vibration dampers
  - installing and/or replacing conductor spacers
  - installing and/or replacing preformed repair rods
  - installing and/or replacing HV cross-arms
  - connecting and/or disconnecting HV bypass bridges
- selection, care, use and maintenance of ropes for live work, including:
  - identification of ropes used for live bare hand work

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  - characteristics
  - application
  - restrictions
  - precautions
  - storage
  - transport
  - cleaning and caring
  - labelling
  - testing
  - records
  - techniques in splicing
  - determining suitability of the rope for continued use
- selection care, use and maintenance of sticks for live work, including:
  - care of live work sticks
  - use and load limitations of live work sticks
  - cleaning live work sticks
  - restoring gloss surfaces of live work sticks
  - repairing small ruptures of live work sticks
  - repairing broken fittings of live work sticks
- checking integrity of insulators prior to work, including:
  - visual and audible assessment
  - check disc voltage difference
  - plot data
  - assess data
  - determine condition of insulator string
- rigging procedures for live bare hand work, including
  - identification of rigging points on structures
  - selection and positioning of rigging equipment on structures
  - selection of and operation of rope tackles
- safety observer principles and responsibilities, including:
  - areas of responsibility
  - supervisor skills
  - protocols and procedures
  - specific duties of a safety observer
  - techniques in observing others in the safe performance of their work
  - minimum approach distances for personnel and hand-held tools
  - special limits of approach.

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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, 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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UETTDRTP33 Maintain energised transmission lines using bare hand technique on a helicopter platform

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 maintenance of energised high voltage (HV) transmission overhead electrical apparatus, i.e. live line work using bare hand techniques from a helicopter platform. It includes the verification of site conditions and potential hazards, the conformation and calculation of physical loads and the selection of appropriate and authorised work methods. It includes the preparation and cleaning of specialist material and tools in accordance with authorised technical instructions.

It also encompasses the undertaking of work health and safety (WHS)/occupational health and safety (OHS)and safe working practices and the rendering inoperative of the automatic re-closing device, including its restoration in accordance with the work plan and the procedure of issuing/accepting electrical access permits and/or relevant work document.

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

All competencies in one (1) of the identified Pathway Unit Group(s) must have been completed.

Pathway 1

Qualified and authorised Transmission Lineworker

Pathway 2

BSBLDR403 Lead team effectiveness

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

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UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRIS65 Contribute to coordinated HV live working

UETTDRTP26 Install transmission structures and associated hardware

UETTDRTP27 Maintain transmission structures and associated hardware

UETTDRTP29 Install and maintain transmission overhead conductors and cables

UETTDRTP30 Inspect transmission overhead structures and electrical apparatus

UETTDRTP31 Maintain energised transmission lines using high voltage live work stick method

UETTDRTP32 Maintain energised transmission lines using high voltage live work bare hand method

UETTDRTP99 Test and verify transmission overhead installations

Competency Field

Transmission

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/plan to maintain energised lines (transmission) using bare hand technique from a helicopter platform	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a

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		quality standard and in accordance with established procedures
	1.3	Risk control measures are identified, prioritised and evaluated against the work method
	1.4	Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5	Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7	Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8	Relevant personnel at worksite are confirmed current in first aid, cardiopulmonary resuscitation (CPR) and other rescue procedures according to requirements
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.11	Personnel participating in the work, including plant operators and contractors, are fully briefed and instructed in respective responsibilities coordinated and authorised, where applicable, in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned and coordinated in accordance with requirements
2 Carry out the maintenance of energised	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and

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lines (transmission) using bare hand technique from a helicopter platform		minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, CPR, other rescue procedures and related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting and tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Maintenance of energised high voltage (HV) overhead electrical transmission apparatus is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe maintenance of energised HV overhead electrical transmission apparatus to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the maintenance of energised lines (transmission) using bare hand technique from a helicopter platform	**3.1**	Work is checked against schedule for conformance and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures

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3.3 Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Relevant work permits (live line) are signed off and client/customer advised in accordance with requirements

3.6 Works completion records, reports, as installed//modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRTP33A Maintain energised transmission lines using Barehand technique on a helicopter platform.

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 UETTDRTP33 Maintain energised transmission lines using bare hand technique on a helicopter platform

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 safely from a helicopter platform including all of the following:
  - usage of a helicopter
  - usage of a platform
- performing at least one (1) of the following:
  - replacing/connecting bridge/bonding connections
  - replacing vibration damper
  - repairing/replacing conductor spacers
  - repairing/replacing conductor joint
  - repairing conductor
  - applying helical splice
- 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:

- working on energised lines at or above 132 kV using live line bare hand techniques from a helicopter platform encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply and aviation authority regulations and/or enterprise requirements associated with extra high voltage (EHV) live line bare hand work form a helicopter platform
  - safety precautions when working on helicopters - live line minimum approach distances, including safe approach for selected helicopter type(s); WHS/OHS hazards and

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precautions; determination of helicopter platform for task and working environment (i.e. network and relevant aircraft authority); identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); live line access authority/permit systems; disabling auto-reclosing function; ensuring functioning of fault current protective devices; checking integrity of insulation prior to work commencement; types and function of specialised live working equipment and tools; safe working policies, procedures and practices when using/operating specialised equipment and tools; methods of using specialised equipment and tools; work team communication; use of safety observers; pilot briefing requirements; emergency response and rescue, including first aid; techniques for working bare hand on live line EHV from a helicopter platform; aircraft operations induction, including flight plan clearances, systems, equipment and communication requirements; types and functions of aerial attachment equipment, including appropriate testing, rating and certification

  - aircrew familiarisation with live-line systems operations and equipment requirements
- principles of high voltage (HV) encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on or near HV
  - electrical and electrostatic principles related to HV lines - relationship of current, voltage and resistance as related to transmission lines; and relationship of phase voltage and respective line voltages
  - production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential
  - HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, performance of a failed disc insulator on the line and the system, determining the minimum allowable number of discs per string for each line voltage in the system before bare hand work is to proceed, techniques in detecting a failed disc in a string, techniques in using appropriate tools and equipment to test a string, and methods of recording data
  - effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, and effects of electrostatic induction on bare hand work
  - application of Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by bare hand live-line workers
  - safety precautions working on or near HV electrical apparatus - safe approach distances (SAD) from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of PPE; permit to work systems and isolation procedures; types and function of specialised live working equipment; safe working policies, procedures and practices when using and operating specialised equipment; methods of using specialised equipment; and emergency response and rescue, including first aid
  - effects of lighting and switching surges on performance of string insulators - health effects to workers, and methods used to alleviate surges on transmission lines
  - magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of

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magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields

- powerline safety practices encompassing:
  - 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 procedures 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 procedure 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; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRTP34 Install/maintain overhead transmission network infrastructure

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 erection of non-energised, pyramid, delta, Pi or enterprise-specific transmission towers and associated hardware and includes installation and maintenance of poles and/or structures and associated hardware and the installation and maintenance of overhead conductors and cables used on towers. It encompasses the erection of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Erection also involves cleaning and welding.

It also encompasses maintenance work associated with the diagnosing of faults, the conducting of visual inspections, the confirmation of phasing and the completion of other enterprise tests on overhead conductors and cables. It also encompasses confirming isolation of systems and circuits, and accepting/issuing electrical permits. The updating of system data, records and/or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

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

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

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circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRIS67 Solve problems in energy supply network equipment

Competency Field

Transmission

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/plan for the installation and maintenance of	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by

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transmission network infrastructure	site inspection
	1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and maintenance of transmission network infrastructure are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel
	1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures
	1.6 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order
	1.8 Relevant personnel at worksite are confirmed current in first aid, tower/pole top rescue and other related work procedures according to requirements
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work, where necessary
	1.10 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures
	1.11 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce,] and individuals in accordance with established procedures

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	1.12	Traffic management plan is identified and implemented
2 Carry out the installation and maintenance of transmission network infrastructure	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.3	Systems and circuits are isolated as required, proved safe to work on in accordance with the requirements/permits and established procedures
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of transmission network infrastructure to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Poles and/or structures and their associated hardware to be installed are stabilised according to requirements
	2.6	Installation of poles and/or structures is carried out in accordance with the work schedule and requirements/established procedures
	2.7	Towers and associated hardware to be erected are stabilised according to requirements
	2.8	Maintenance, including repair and/or replacement of poles and/or structures, is carried out in accordance with the work schedule and requirements/established procedures
	2.9	Overhead conductor/cables are strung, tensioned and terminated in accordance with requirements/established procedures
	2.10	Conductors and anti-vibration devices, spaces/spreaders are secured in accordance with established procedures
	2.11	Electrical connections are made in accordance with requirements/established procedures
	2.12	Maintenance, including repair and/or replacement of

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		overhead conductors and cables used on towers, is carried out in accordance with the work schedule and requirements/established procedures
	2.13	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks reported to immediate authorised personnel for directions according to established procedures
	2.14	Erection of towers and associated hardware is carried out in accordance with the work schedule and requirements/established procedures
	2.15	Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures
	2.16	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.17	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of transmission network infrastructure	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported in accordance with established procedures
	3.2	Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
	3.5	Relevant work permits are signed off and the transmission network infrastructure is returned to service in accordance with requirements
	3.6	Works completion records, reports, as installed/modified drawings and/or documentation and information are finalised and processed and appropriate personnel 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTP34A Install/maintain overhead transmission network infrastructure.

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 UETTDRTP34 Install/maintain overhead transmission network infrastructure

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
- installing and maintaining at least one (1) of the following:
  - wood pole/structure
  - steel pole/structure
  - concrete pole/structure
  - composite pole/structure
- incorporating at least three (3) of the following hardware:
  - insulators
  - cross-arm braces
  - crossarms
  - pole steps
  - shackle straps
  - earth leads
  - traction supports
  - traction registration
  - bonding
- incorporating at least one (1) of the following xxx:
  - baulking
  - stays
  - concreting including foundation
- incorporating at least one (1) of the following xxx:
  - crane
  - auger/erector
  - ‘A’ frame

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  - lifting beam
  - pole pikes
  - helicopter lift
- erecting any one (1) of the following towers:
  - pyramid
  - delta pi
  - enterprise-specific type
- incorporating at least two (2) of the following:
  - insulators
  - clamps
  - bolts
  - structural components
- using at least one (1) of the following methods:
  - welding
  - cleaning
- installing and maintaining at least one (1) of the following conductor types:
  - copper
  - aluminium
  - steel
  - composite
  - aluminium/steel reinforced
  - pilot
- incorporating at least two (2) of the following access equipment:
  - elevated work platform (EWP)
  - portable platform
  - gondola
  - hook ladder*
  - elevated work box
  - (*must do)
- incorporating at least five (5) of the following:
  - winches*
  - tension equipment*
  - stringing equipment
  - cable trailers
  - crimping equipment *
  - pre-formed splices
  - hardware
  - cable drum stands
  - ropes

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  - rollers/ sheaves
  - comealongs
  - swivels
  - (*must do)
- incorporating at least two (2) of the following:
  - voltage/de-energised indicating device
  - field intensity meter
  - operating rods
  - (*must do)
- incorporating at least one (1) of the following methods to tension overhead conductors:
  - dynamometer
  - site board
  - abney level
  - sag chart*
  - theodolite
  - (*must do)
- 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:

- mathematics techniques encompassing:
  - calculations involving fractions, decimals, ratios and proportions
  - calculations involving area, volume, mass and density
  - calculations involving transposition and substitution of formulae
  - calculations involving simple trigonometric problems
- engineering mechanics encompassing:
  - identification of basic concepts, principles and applications - application of velocity, acceleration, force, density, torque and pressure
  - applications of the International System of Units (SI) units
  - the relationship between work, power and energy
  - behaviour of object under force - using a block and tackle under load, concept of mechanical advantage, determination of resultant forces and determining the sag in a catenary conductor and the force applied at each end
  - fundamentals of the basic laws of fluid mechanics
- materials properties encompassing:
  - identification and classification of engineering materials material properties
  - types and applications - properties of tensile strength; effects of temperature on the expansion of metals; ductibility, malleability, work hardening and annealing; and the

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conditions that lead to corrosion and the properties of timbers

- basic rigging techniques encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with rigging, including the operation of cranes, hoists and winches and relevant certification and licensing (if required)
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - safe use of rigging equipment, tools and associated equipment - types, techniques and application
  - site inspection procedures - identifying hazards, assessing and controlling risks, appropriate sequence of loading and unloading
  - determining the mass and dimensions of load
  - selection and inspection procedures - rigging equipment, materials and tools (natural and synthetic fibre ropes and chains, fittings, winch and capstan); ratings of wire ropes and slings; removing, repairing and replacing damaged parts
  - techniques for assembling and erecting power winches and capstans
  - checking the integrity of support structure - visual inspection of load connections
  - techniques in moving, lifting, shifting, managing and placing loads - use of appropriate communication and signalling methods; codes of practice/compliance, enterprise and Commonwealth/state/territory legislative requirements; weather conditions; erection of safety nets and lines; methods of fixing and anchoring loads; and load stability
- procedures in providing store support encompassing:
  - classification and identification of equipment, components and tools
  - procedures for purchasing/ordering items, removing/dispatching items, stocktaking, security and bookkeeping/record keeping
  - material handling - warehouse/depot storage techniques, handling equipment, pallet lift trucks and forklifts, and cable drum handling equipment
  - safety procedures - storage and care of safety equipment, handling hazardous materials, storage of hazardous substances and dangerous goods, and depot safety procedures
  - manufacturer and supplier information, including material safety data sheets (MSDS)
- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems; and radial, parallel and ring main feeders

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  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the HV equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- installation of poles and or structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to installing poles and associated hardware
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - characteristics and applications of different types of poles and associated hardware
  - techniques for installing poles and associated hardware - types of installation equipment/tools, excavation methods, types of footings/foundations, types of attachments, earthing systems, and clearances between conductors
  - safe methods of erecting and stabling poles and/or structures and cross-arms
  - techniques for maintenance of poles and associated hardware - stabilisation techniques for unstable poles
  - methods of strengthen poles, maintenance and replacement of high voltage (HV) insulators and cross-arms
- transmission structures and hardware encompassing:
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings
  - types of structures
  - types and function of associated hardware/equipment and insulators
  - types of conductors
  - location of transmissions structures
  - other equipment used on transmission structures, e.g. aircraft warning devices
- procedures for routine maintenance on transmission structures and hardware encompassing:
  - procedures for gaining access permits
  - reasons for gaining access

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  - types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the transmission supply authority
  - erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system, and construction of a square rigging system
  - procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
  - installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, and procedures for installations of temporary work platforms
  - installation of conductor protective hardware - types and selection of common dampers, tools and equipment, control of Aeolian vibration and procedures for the installation of dampers onto conductors
  - dead line insulator washing - supply authority regulations, and procedures for washing de-energised transmission lines
- procedures for installation and maintenance on transmission lines, structures and hardware encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of transmission lines and associated equipment
  - requirements for the use of enterprise construction manuals, system diagrams/plans and drawings - minimum construction clearances for transmission lines and sag/tension requirements
  - construction types and structures used in transmission lines
  - types, sizes and characteristics of transmission conductors - aluminium conductors, steel reinforced and earthing conductors
  - types of electrical connections used to connect transmission conductors - compression termination and bolted termination
  - causes and effects of poor electrical connections
  - types and application of specialised tools, equipment and hardware for the stringing of transmission conductors
  - techniques for stringing, tensioning and terminating transmission conductors
  - techniques for installation of associated hardware used on transmission towers
  - techniques for maintenance of damage transmission conductors - repair and replacement
- safe working practices and procedures for the installation of overhead transmission conductors encompassing:
  - limits of approach for personnel, vehicles, mobile plant and EWP
  - requirements of persons prior to making bare hand contact with dead low voltage (LV) mains and apparatus
  - requirements of relevant electrical access permits necessary to allow work to be performed on LV and HV apparatus
  - safe working practices - requirements to enable safe working on conductive poles; procedures to attach an on-site earthing device to de-energised LV and HV overhead circuit; safe working practices when working with associated hardware/equipment and

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insulators; precautions of voltages on transmission structures; dangers when working at heights; identification of hazards; assessing and controlling risks; types, selection, maintenance and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures; and safe working practices when using specialised equipment
    - emergency response and rescue, including first aid
- powerline safety practices encompassing:
    - 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 procedures 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; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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:

- 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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UETTDRTP35 Install/maintain transmission network infrastructure electrical 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 covers the maintenance of non-energised, pyramid, delta, Pi or enterprise-specific transmission towers and associated hardware and the inspection requirements of overhead structures, such as towers and electrical apparatus. Overhead structures include towers and overhead conductors and/or cables, including underground and overhead transition points, electrical equipment, hardware and/or earthing systems.

This unit encompasses the repair and/or replacement of components in accordance with construction plans, specifications, work orders and standing enterprise requirements. Maintenance also involves cleaning and welding. The updating of system data, records and/or completion of relevant documentation in accordance with enterprise requirements also forms part of this competency.

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

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

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UEENEEG063A Arrange circuits, control and protection for general electrical installations

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRIS67 Solve problems in energy supply network equipment

UETTDRTP34 Install/maintain overhead transmission network infrastructure

Competency Field

Transmission

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/plan to install and maintain transmission network infrastructure	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are received, analysed and confirmed, as necessary, by

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electrical equipment

site inspection

1.2 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites

1.3 Work health and safety (WHS)/occupational health and safety (OHS) policies and procedures related to requirements and established procedures for the installation and maintenance of transmission network infrastructure electrical equipment are obtained and confirmed for the purposes of the work to be performed and communicated to relevant personnel

1.4 Work is prioritised and sequenced following consultation with others for completion within acceptable timeframes and in accordance with established procedures

1.5 Hazards are identified, WHS/OHS risks assessed and control measures prioritised, implemented and monitored, including emergency exits kept clear, according to established procedures

1.6 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order

1.7 Relevant work permits are obtained to access and perform work according to requirements and/or established procedures

1.8 Relevant personnel at worksite are confirmed current in first aid, tower/pole top rescue and other related work procedures according to requirements

1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved to carry out work where necessary

1.10 Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures

1.11 Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities confirmed, where applicable, in accordance with established procedures

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	1.12	Traffic management plan is identified and implemented
2 Carry out the installation and maintenance of transmission network infrastructure electrical equipment	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices to reduce the incidents of accidents and minimise waste are monitored and followed in accordance with requirements and/or established procedures
	2.2	Towers and associated hardware to be erected are stabilised according to requirements
	2.3	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely followed and currency according to requirements confirmed
	2.4	Essential knowledge and associated skills are applied in the safe installation and maintenance of transmission network infrastructure electrical equipment to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.6	Inspection of overhead structures and electrical apparatus used on towers is carried out in accordance with the work schedule and requirements/established procedures
	2.7	Maintenance, including repair and/or replacement of towers, is carried out in accordance with the work schedule and requirements/established procedures
	2.8	Unplanned events in the erection of towers and associated hardware are undertaken within the scope of established procedures
	2.9	Known solutions to a variety of problems are applied using acquired essential knowledge and associated skills
	2.10	Ongoing checks of quality of the work are undertaken in accordance with instructions and established procedures
3 Complete the installation and maintenance of	**3.1**	Work undertaken is checked against work schedule for conformance with requirements and anomalies reported

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transmission network infrastructure electrical equipment	in accordance with established procedures
	3.2 Accidents and/or injuries are reported in accordance with requirements/established procedures, where applicable
	3.3 Worksite is rehabilitated, cleaned up and made safe in accordance with established procedures
	3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage or disposed of in accordance with established procedures
	3.5 Relevant work permits are signed off and towers and associated hardware are returned to service in accordance with requirements
	3.6 Work completion records, reports, as installed/modified drawings and/or documentation and information are finalised and processed and appropriate 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 UETTDRTP35A Install/maintain transmission network infrastructure electrical 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 UETTDRTP35 Install/maintain transmission network infrastructure electrical 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
- maintaining any one (1) of the following types of towers:
  - pyramid
  - delta pi
  - enterprise-specific type
- incorporating at least two (2) of the following:
  - insulators
  - clamps
  - bolts
  - structural components
- incorporating at least one (1) of the following maintenance tasks:
  - welding
  - cleaning
- inspecting at least four (4) of the following:
  - towers
  - overhead conductors/cables
  - structural fittings
  - electrical equipment
  - hardware
  - earthing systems
- incorporating at least two (2) of the following:
  - visual*
  - infra-red camera
  - X-ray

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  - camera
  - binoculars/telescope
  - (* must do)
- incorporating all the following:
  - reporting procedures
  - reporting outcomes
- 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:

- procedures for routine maintenance on transmission structures and hardware encompassing:
  - procedures for gaining access permits
  - reasons for gaining access
  - types of maintenance procedures on transmission structures - procedure to follow for inspection/patrols according to the transmission supply authority
  - erecting and removing of transmission equipment and hardware from a tower - climbing procedures, square rigging principles, calculation of forces at work within a given square rigging system and construction of a square rigging system
  - procedures for changing insulators - vertical angle suspension, strain insulator, post insulator (horizontal or vertical) and bridge insulator, and calculation of conductor forces
  - installation of temporary work platforms - types and function of installation tools and equipment, precautions and work methods to follow, and procedures for installations of temporary work platforms
  - installation of conductor protective hardware - types and selection of common dampers, tools and equipment; control of Aeolian vibration and procedures for the installation of dampers onto conductors
  - dead line insulator washing - supply authority regulations, and procedures for washing de-energised transmission lines
- inspection of towers and structures used for transmission lines encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - characteristics of materials used for towers structures within the electrical transmission system - faults that occur that influence the integrity of the structure
  - deterioration prevention techniques - relationship between steel and other materials, inspection procedures for deterioration and deterioration prevention procedures in steel
  - procedures for the repair of deterioration in steel
- inspection of transmission lines encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements
  - clearances and safety procedures
  - ground line inspection procedures of electrical transmission lines - requirements for inspection of transmission lines and insulators, use of specific equipment and testing

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devices during testing/inspection, techniques in transmission line inspection and methods of recording data
    - overhead line inspection procedures of electrical transmission lines - methods and requirements for overhead line inspection on electrical structures, clearances for overhead conductors, cables and structures, techniques used to obtain close inspection of transmission lines, and use of specific equipment and testing devices during testing/inspection
    - methods of recording data
- powerline safety practices encompassing:
    - 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 procedures 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, 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; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must 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 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, 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

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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UETTDRTP99 Test and verify transmission overhead installations

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 test and verify transmission overhead installations in the electricity supply industry (ESI).

It includes visual inspection and verification of maintenance requirements of de-energised transmission towers and associated hardware. It also includes repairing and replacing components in accordance with construction plans, specifications, work orders and workplace procedures, updating system data and records and completing relevant documentation.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

UETTDRTP26 Install transmission structures and associated hardware

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UETTDRTP27 Maintain transmission structures and associated hardware

UETTDRTP29 Install and maintain transmission overhead conductors and cables

UETTDRTP30 Inspect transmission overhead structures and electrical apparatus

Competency Field

Transmission

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 inspect, verify and replace or repair overhead transmission installations	**1.1** Work schedules, construction 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 accessing transmission overhead installations 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 are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed in accordance with workplace procedures

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	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 Inspect, verify and replace or repair overhead transmission installations	**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	Testing and verifying transmission of overhead installations is completed in agreed timeframes and to quality standards with a minimum of waste in accordance with workplace procedures
	2.4	Overhead transmission installations are confirmed as de-energised and able to be earthed in accordance with workplace earthing procedures
	2.5	Overhead transmission installations and associated hardware are visually inspected and confirmed as positioned, secured and terminated/connected in accordance with job requirements and workplace procedures
	2.6	Overhead transmission installations are checked for suitability and compliance with workplace construction standards and relevant electrical network supply industry standards
	2.7	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete inspection, verification and replacement or repair of overhead transmission installations	**3.1**	WHS/OHS risk control work completion measures and procedures are followed

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3.2 Completed work is checked against work schedule, construction plans and drawings for compliance and anomalies are reported in accordance with workplace procedures

3.3 WHS/OHS and environmental incidents are reported in accordance with workplace procedures, as required

3.4 Worksite is rehabilitated, cleaned up and made safe in accordance with workplace procedures

3.5 Non-compliance defects are identified, corrected and/or reported in accordance with workplace procedures

3.6 Recommendations for rectifying defects are made in accordance with workplace procedures

3.7 Mandatory documentation is completed in accordance with workplace procedures

3.8 Tools, equipment and surplus resources and materials are, where appropriate cleaned, checked and returned to storage in accordance with workplace procedures

3.9 Relevant work permits are signed off and electrical equipment (network infrastructure) are returned to service in accordance with workplace procedures

3.10 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 UETTDRTP99A Test and verify transmission overhead

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installations.

Links

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Assessment Requirements for UETTDRTP99 Test and verify transmission overhead installations

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
- using at least two (2) of the following methods:
  - visual*
  - infra-red camera
  - X-ray
  - camera
  - binoculars/telescope
  - (* must do)
- inspecting structures including at least one (1) of the following:
  - pyramid
  - delta pi
  - enterprise specific type
- installing associated hardware including at least three (3) of the following:
  - insulators
  - clamps
  - bolts
  - conductor spacers
  - vibration dampers
  - structural components
- inspecting conductors including at least one (1) of the following:
  - copper
  - aluminium
  - steel
  - aluminium/steel reinforced

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- undertaking work activities from at least two of the following:
  - elevated work platform (EWP)
  - portable platform
  - gondola
  - hook ladder*
  - elevated work box (EWB)
  - (*must do)
- using specialised equipment including all of the following:
  - voltage/de-energised indicating device
  - earthing conductors
- complying with all of the following:
  - reporting procedures
  - reporting outcomes

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:

- legislated regulations, including:
  - legislation and regulations that require installations and equipment to be inspected and tested to ensure they are safe
  - the person/bodies responsible for the various aspects of ensuring transmission overhead installations are safe
  - results of inspections and tests that show transmission overhead installation is safe for connection to the supply
  - results of periodic inspection and tests that show construction and installation of equipment is safe to use
  - results of periodic inspection and tests that show the transmission overhead installations electrical equipment are safe to use
- testing installations, including:
  - transmission system phasing is correct and conforms to network construction standards
  - electrical transmission network voltage levels comply with network supply standards
  - potential present upon transmission network neutral conductors conforms network supply standards
  - insulation resistance is adequate
  - transmission earthing system components are verified as correctly installed
- documentation, including:
  - results of inspections and tests conducted on a transmission overhead installation are in accordance with work requirements and ensure the transmission overhead installation is safe
  - documents of periodic inspection and testing of transmission overhead installation and

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equipment in accordance with requirements
- non-compliances and defects reported in accordance with established 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 testing and verifying transmission overhead installations
- network constructions and network supply standards
- 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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UETTDRTS21 Maintain interdependent network protection and control 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 the maintenance of network protection and control in interdependent situations and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and/or overhaul and functional checks of interdependent network protection and control systems. It includes the requirements to prove the functionality of interdependent and discrete schemes, such as circuit breaker fail, master controlled earth fault, inter-tripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation and load rejection.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS29 Develop power systems secondary isolation instructional documents

Competency Field

Testing

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 for the maintenance of network protection and control systems (interdependent)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance of network protection and control systems (interdependent), are reviewed and determined
	1.2 Purpose of the maintenance of network protection and control systems (interdependent) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the maintenance of network protection and control systems (interdependent) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational

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		established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the maintenance of network protection and control systems (interdependent)	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Maintenance of network protection and control systems (interdependent) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the scheme are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate

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		authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network protection and control systems (interdependent) is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the maintenance of network protection and control systems (interdependent)	**3.1**	Final inspections of the network protection and control systems (interdependent) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the maintenance of network protection and control systems (interdependent) documents are issued and records are updated 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 UETTDRTS21A Maintain interdependent network protection and control 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 UETTDRTS21 Maintain interdependent network protection and control 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) requirement, including the use of risk control measures
- applying sustainable energy principles and practices
- demonstrating five (5) times, each of the following activities:
  - isolating protection, control and alarms associated with interdependent protection and control schemes
  - carrying out function tests (trips and alarms) on interdependent protection and control schemes
  - writing reports on performance of interdependent protection and control schemes
  - isolating ‘in service’ current transformers
- 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:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations regarding - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault)
- principles of isolation and tagging procedures associated with protection testing

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encompassing:

- standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
- requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
- techniques in documenting isolations
- techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards

- maintenance and commissioning procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance and commissioning procedures
  - requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
  - techniques in maintenance and commissioning procedures – planning, policy and testing techniques
  - close out requirements
- relay manufacturer specifications encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
  - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
  - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:
  - 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 personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue, including first aid

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  - techniques in the handling and disposing of insulation materials - polychlorinated bi-phenyls (PCB's), asbestos, insulating oil and sulfur hexafluoride (SF6) gas
- procedures to undertake a visual inspection of a scheme encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
  - requirements for the use of manuals, system diagrams/plans and drawings
  - identifying obvious deficiencies in operating to the standard functionality
  - techniques in determining relay malfunction - targeting
  - techniques in determining wiring defects
- operation and maintenance procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, and trip and alarm checks
  - surge relay types and uses, including transformer main tanks and diverter switch chambers
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
  - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature
  - interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturers data and measurements
  - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- infra-red imaging principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to Infrared Imaging
  - 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
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for infra-red imaging reporting
  - techniques in evaluating serviceability of circuit breaker operation
  - procedures for obtaining correct HV switchyard arrangements - identification of hazards and controlling risks, safety procedures and precautions, responsibilities and protocols, and identifying switching resources
  - safety precautions when testing and measuring equipment with infra-red imaging - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE; responsibilities and

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protocols

- commissioning procedures associated with distribution protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy and testing techniques
  - close out requirements
- operation and maintenance procedures associated with voltage regulation schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - principles of operation and operating sequences - voltage control, VAR control, live bus/dead bus synchronising checks, tap changer principles, requirements for parallel operations, settings and grading
  - techniques associated with isolation requirements, enterprise maintenance requirements, setting checks, low voltage (LV) injections and electrical measurements
  - ancillary equipment - transducers, buswire schemes, tap position indicators, local/remote control systems and alarm systems
  - voltage regulation scheme types - electromechanical, micro-processor or combinations of both
- types and applications of test equipment encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
  - types and applications of test equipment used on discrete protection scheme
  - techniques in the use of test equipment - electronic test equipment (Doble and Ohmnicrome), gas injection equipment, manufacturer test equipment, multimeters, phase angle meters and, meggers
- electrical equipment associated with distribution field device protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: automatic circuit reclosers (ACR), gas switches, secondary injection tests, primary injection tests, trunked mobile radio (TMR), supervisory control and data acquisition (SCADA), remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, direct current (d.c) supplies, and alternating current (a.c.) supplies and alarms)
- circuit breaker auxiliary systems encompassing:
  - types and characteristics of high-pressure air systems, including air storage and air handling processes
  - types and characteristics of d.c. systems, including battery types, charging systems and protection systems

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  - types and characteristics of special ambient gas (SF6) systems, including gas conditioning, storage and handling systems
  - types and characteristics of vacuum interrupters
  - types and characteristics of oil filled and oil handling
- detailed operation and setting of 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
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including inter-tripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
  - pilot wire and 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
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- procedures for the location and rectification of faults in electrical equipment up to 1000 volts a.c. and or 1500 volts d.c. encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
  - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
  - fundamental electrical concepts - effects of current; practical resistors; sources of electromagnetic field; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
  - fundamentals of single phase induction motors - basic principles of operation (non-mathematical); motor identification; motor ratings; basic principles of operation of control equipment and protection devices; fault conditions and symptoms; safe isolation procedures; test equipment; safe testing procedures, including continuity; fault types in phase splitting and universal type motors; and fault-finding procedures (prescriptive)
  - fundamentals of three phase induction motors - basic principles of operation

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(non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)

  - fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and or 1500 volts d.c. encompassing:
  - safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 Safe working on or near low-voltage electrical installations and equipment, or equivalent
  - safe use of tools and plant
  - safe use of ladders and elevated work platforms (EWP)
  - safe use of PPE
  - hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards and other hazardous areas
  - special situations
  - procedures for dealing with fires associated with electrical equipment
  - procedures for dealing with PCBs
  - electric shock victim rescue methods and procedures - basic first aid treatment for shock, burns and bleeding
  - purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardiopulmonary resuscitation (CPR), combined application of EAR and ECC (purpose of each procedure and application)
  - components of a basic electrical circuit(s) – source, control, protection and load
  - types of circuit diagrams – symbols, conventions, interpretations and free sketches
  - types of circuit connections and functions - open circuit, closed circuit and short circuit
  - techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; and using Ohms law
  - fundamental principles of electrical concepts - effects of current; practical resistors; sources of electromagnetic field; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - techniques in insulation resistance measurement and requirements
  - earthing principles and systems
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and or 1500 volts d.c. encompassing:
  - methods for testing insulation resistance - continuity of prospective earthing conductor, continuity between exposed conductive parts and the earthing system
  - methods of recognising acceptable test results for compliance with safety requirements

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- methods of recognising unacceptable test results requiring an appropriate qualified person for further investigation
- cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, and colour codes
- single and three phase systems and loads - number of active and live conductors required, line and phase voltage, and typical loads
- identification and rating of general appliances
- single phase induction motors - motor identification, motor ratings and direction of rotation
- three phase induction motors - motor identification, motor ratings and direction of rotation
- single and three phase heaters - types of heaters, heater identification and heater ratings
- electrical distribution arrangement - power systems within premises, purpose of switchboards/distribution boards (residual current devices and EL circuit breakers)
- circuit isolation and protection devices
- isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulation, codes of practice and procedures
- disconnection procedures, practices and requirements
- types of replacement equipment
- methods of ensuring equipment is safe to connect to supply
- methods of reconnection procedures, practices and requirements
- methods of return equipment to service

- effects of harmonics encompassing:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators, motors and quality of supply.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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industry
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals
- working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and methods and in a variety of environments.

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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UETTDRTS22 Commission interdependent network protection and control 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 the commissioning of network protection and control systems in interdependent situations and includes isolation, inspection, monitoring, testing, adjustment, and repair, refurbishment and/or overhaul and functional checks. It also includes schemes, such as circuit breaker fail, master controlled earth fault, impedance and differential relays, inter-tripping, blocking, synchronising, pilot wire, phase comparison, load shedding, voltage control, parallel operation and load rejection. This includes commissioning of discrete and interdependent schemes.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

Competency Field

Testing

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 for the commissioning of network protection and control systems (interdependent)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of network protection and control systems (interdependent), are reviewed and determined
	1.2 Purpose of the commissioning of network protection and control systems (interdependent) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the commissioning of network protection and control systems (interdependent) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief

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	1.5	Testing parameters are established from organisational established procedures and policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) is selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of network protection and control systems (interdependent)	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Commissioning of network protection and control systems (interdependent) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards,

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		safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network protection and control systems (interdependent) is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the commissioning of network protection and control systems (interdependent)	**3.1**	Final inspections of the network protection and control systems (interdependent) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the commissioning of network protection and control systems (interdependent) documents are issued and records are updated 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS22A Commission interdependent network protection and control 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 UETTDRTS22 Commission interdependent network protection and control 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
- demonstrating commissioning of a protection and control system involving at least five (5) of the following:
  - circuit breaker fail protection
  - master controlled earth fault
  - inter-tripping
  - blocking
  - synchronising
  - pilot wire
  - phase comparison
  - load shedding
  - voltage control protection
  - frame leakage
  - delta current
  - reverse power
- 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:

- commissioning procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures

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  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in high voltage (HV) networks, including voltage control, voltage-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 personal protective equipment (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.

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
- applicable documentation including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals
- working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

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Links

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UETTDRTS23 Conduct evaluation of power system substation faults

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 procedure in evaluating power system incidents by following a process of downloading event and disturbance record information from protection relays. This includes interpreting items, such as alarms, relay targets, relay settings, event records, disturbance records and sequence of events records. It also encompasses the evaluation and/or investigation of relay operation, relay schemes functionality and relay settings.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Testing

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 for the evaluation of power system events	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the evaluation of power system failures, are reviewed and determined
	1.2 Purpose of the evaluation of power system events are established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the evaluation of power system failures are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

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	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the evaluation of power system events	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Following evaluation of power system events, decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and /or engineering models of the evaluation of power system events are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements

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	2.7 Testing of power system is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the evaluation of power system events	**3.1** Final evaluation of all relevant data pertaining to the power system event is undertaken to ensure the recommendations comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the evaluation of power system event documents are issued and records are updated 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS23A Conduct evaluation of power system substation faults.

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 UETTDRTS23 Conduct evaluation of power system substation faults

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
- demonstrating at least two (2) downloads from protection relays or recording equipment from each of the following:
  - relay panel
  - remote location
- developing five (5) evaluation reports on power system events, including all of the following:
  - interpretation of targets in a substation
  - interpretation of fault reports
  - interpretation of downloaded event data
  - development of valid conclusions and recommendations
- 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:

- 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

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systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assess resources to establish and maintain WHS/OHS management systems
- power distribution network documentation encompassing:
    - requirements for the use of manuals, system diagrams/plans and drawings and for plans, such as work method statements for the control of WHS/OHS risks
    - types and application of power distribution network documentation drawings and documents - wiring and schematic diagrams, drawings and switching symbols, mechanical drawings dealing with the power distribution network, project charts, schedules, graphs, technical manuals and catalogues, and instructions/worksheets
    - interpretation of different diagrams and documentation on low voltage (LV) and high voltage (HV) systems - overhead distribution extensions, underground distribution extensions, distribution substations and street lighting systems
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
    - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature
    - interpretation and analysis of the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturer data and measurements
    - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- system components and layouts encompassing:
    - distribution system layouts - overhead/underground, urban/rural, HV customers, high rise building systems, three phase lines, single phase lines, single wire earth return (SWER) systems, spur, parallel and ring systems, and typical substation types
    - transmission system layouts - lines, buses, transformers and cables; line/bus layouts, including single, double, ring and breaker and half systems, and HV crossing methods
- calculation of fault levels encompassing:
    - calculation of fault levels in symmetrical and asymmetrical fault conditions - types of faults, interconnected and radial systems, symmetrical components, representation of voltages and currents, sequence impedances of system plant, calculation/determination of sequence impedance networks, determination of operative sequence impedances, fault or arc impedances and first approximation techniques
    - interrupting device capabilities - determination of fault current breaking capability and let through energy capability of fuses and circuit breakers, direct current (d.c.) offset and transient condition effects
- protection system types 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, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity and reliability

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  - 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
- detailed operation and setting of 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, current transformer (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
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including inter-tripping, 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
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- detailed operation of 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 and 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)
  - complex protection systems for communications

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- 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
- working at realistic heights above ground i.e. above 3 metres, in limited spaces, with different structural/construction types and method and in a variety of environments.

Links

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UETTDRTS24 Design testing and commissioning procedures for field devices and substations

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 testing and commissioning procedures for new substation and field devices in accordance with design. This will involve analysis of settings, and a thorough understanding of the circuit design, which will involve covering areas such as metering, communication circuits and supervisory control and data acquisition (SCADA).

It also includes the procedures needed to enable proof of correct operation of all circuits to design specifications. It also encompasses the need for supplying accurate communication in the format that is acceptable to the operating or testing authority.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

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UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Protection Relays and Meters Pathway Unit Group

UETTDRTS28 Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

UETTDRTS25 Maintain and test and metering schemes

UETTDRTS26 Commission power systems metering schemes

UETTDRTS29 Develop power systems secondary isolation instructional documents

Primary Plant Pathway Unit Group

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS32 Conduct evaluation of power systems primary plant

Protection Systems Pathway Unit Group

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS35 Maintain complex network protection and control systems

Competency Field

Testing

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 Plan for the design of testing and commissioning procedures for substation and field devices	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the undertaking of design of testing and commissioning procedures for substation and field devices, are reviewed and determined
	1.2	Purpose for designing of testing and commissioning procedures for substation and field devices is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures on policies and specifications for the design of testing and commissioning procedures for substation and field devices are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures on policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the design of	**2.1**	Circuit/systems modelling is used to evaluate alternative

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testing and commissioning procedures for substation and field devices	proposals in accordance with established procedures
	2.2 WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 Design of testing and commissioning procedures for substation and field devices decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical and/or engineering models of design testing and commissioning procedures for substation and field devices are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7 Testing and commissioning procedures for substation and field devices are developed according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation

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		initiatives in accordance with established procedures
3 Complete the design of testing and commissioning procedures for substation and field devices	**3.1**	Final review of testing and commissioning procedures for substation and field devices is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of design testing and commissioning procedures for substation and field devices documents are issued and records are updated 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 UETTDRTS24A Design testing and commissioning procedures for field devices and substations.

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 UETTDRTS24 Design testing and commissioning procedures for field devices and substations

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 testing and commission procedures for at least three (3) of the following substation equipment:
  - bus protection
  - feeder/line protection
  - transformer protection
  - earth fault protection
  - backup protection
  - metering schemes
  - communication and supervisory control and data acquisition (SCADA) schemes
- developing testing and commissioning procedures for at least two (2) of the following field devices:
  - regulators
  - automatic circuit reclosers (ACR)/gas switch
  - line capacitors
- 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:

- powerline safety practices encompassing:
  - 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

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- 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 procedures 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, 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; and practical demonstration/rehearsals of rescuing a person from heights and from confined spaces and emergency procedures for the rescue of an electric shock victim, including cardiopulmonary 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

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault)
- principles of isolation and tagging procedures associated with protection testing encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
  - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
  - techniques in documenting isolations
  - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise

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standards
    - techniques in the installation and maintenance procedures for protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance and commissioning procedures associated with discrete protection schemes encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with maintenance and commissioning procedures
    - requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
    - techniques in maintenance and commissioning procedures – planning, policy and testing techniques
    - close out requirements
- relay manufacturer specifications encompassing:
    - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
    - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
    - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- procedure to undertake a visual inspection of a scheme encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identifying obvious deficiencies in operating to the standard functionality
    - techniques in determining relay malfunction - targeting
    - techniques in determining wiring defects
- operation and maintenance procedures associated with discrete protection and control systems encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with operating procedures
    - requirements for the use of operating manuals, system diagrams/plans and drawings
    - techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, and trip and alarm checks
    - surge relay types and uses, including transformer main tanks and diverter switch chambers
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
    - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature

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  - interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturer data and measurements
  - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- substation safety practices encompassing:
  - 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 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 - the rescue 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 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 HV insulation systems encompassing:
  - insulation design principles - common materials used, electrical characteristics, thermal characteristics, uses and applications to substation HV plant and equipment, grading, construction and cooling
  - common contaminants and their effects - internal contaminants and external contaminants
  - testing and measurement of insulation quality - test types and common measuring instruments and techniques, resistance and resistivity, losses, measurement errors, temperature corrections and safe work practices related to testing and measurement
  - safety precautions when testing and measuring HV insulation systems - 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)

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- principles of power transformer construction and operations encompassing:
  - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, transmission and generation types
  - reactor types - shunt and series, applications and design considerations
  - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
  - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
  - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
  - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
  - nameplate details - BIL, tapping winding detail, physical layout, cooling ratings and physical details
  - transformer and reactor cooling types and their effects on design and rating
  - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
  - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
  - operating constraints as single units and in parallel
  - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum types, Jansen mechanisms, dead tank and live tank types) and control system characteristics
  - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in HV networks, including voltage control, VAR control and transient response capacity
  - types of static reactive plant, including HV capacitors, HV reactors, static VAR compensators (SVC) 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
- principles of power transformer high speed OLTC encompassing:

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  - selector types and applications for HV power transformers
  - diverter switch types and applications for HV power transformers, including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag and pennant cycle
  - ratings and construction principles
  - operating mechanism types, stored energy systems and associated control systems
  - operating principles and operating sequences of selectors and diverters
  - measurement requirements, including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
  - online diagnostic tools and devices
  - ancillary equipment, including online filters, over pressure relays and devices
  - testing requirements, including cycle timing, differential delay, energy accumulator mechanical and operational tests and control system functional tests
  - safety precautions when testing and maintaining HV power transformer OLTC - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- operation and maintenance procedures associated with voltage regulation schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - principles of operation and operating sequences - voltage control, VAR control, live bus/dead bus synchronising checks, tap changer principles, requirements for parallel operations, settings and grading
  - techniques associated with - isolation requirements, enterprise maintenance requirements, setting checks, low voltage (LV) injections and electrical measurements
  - ancillary equipment, including transducers, buswire schemes, tap position indicators, local/remote control systems and alarm systems
  - voltage regulation scheme types, including electromechanical, micro-processor or combinations of both
- types and applications of test equipment encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
  - types and applications of test equipment used on discrete protection scheme
  - techniques in the use of test equipment - electronic test equipment (Doble and Ohmnicrome), gas injection equipment, manufacturer test equipment, multimeters, phase angle meters and meggers
- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of HV and LV
  - voltage control devices - voltage regulators applied to generators and synchronous phase modifiers, electromagnetic voltage regulators; series and parallel capacitors; OLTC

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transformers; and SVC, such as saturated reactor compensators, thyristor controlled reactor compensators and combined systems
    - production of harmonics and methods of harmonic control
    - location of voltage control devices within the system
- transient over voltages encompassing:
    - causes and effects of transient over voltages - switching transients and lightning transients, and effects on plant items
    - control techniques and systems - surge diverters, shield wires and circuit breaker arc control
    - insulation systems - insulation systems, insulation coordination and insulation grading
- procedure to undertake a visual inspection of a scheme encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identifying obvious deficiencies in operating to the standard functionality
    - techniques in determining device malfunction
    - techniques in determining wiring defects
- commissioning procedures associated with relevant equipment encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
    - requirements for the use of commissioning manuals, system diagrams/plans and drawings
    - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- detailed operation and setting of 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
- detailed operation of interdependent protection systems encompassing:
    - overcurrent and earth leakage schemes, including inter-tripping, 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
    - busbar protection and circuit breaker failure protection
    - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- detailed operation of metering devices and principles encompassing:

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  - common circuit configurations
  - meters and measurement principles
  - instrument transformer application
  - testing of metering systems and devices
  - implications of market operation
- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence and the use of oscilloscopes
- detailed operation of protection test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference and the use of primary, secondary and gas injection equipment
- detailed operation of metering test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurements of, voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices
- detailed operation of field device test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurements of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency, harmonics and the use of transient and data logging devices
- procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for avoidance of further damage
  - interpretation of specific test results - cause/effect
  - techniques for isolation to appropriate level - half-split, module/function isolation (kernel

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technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways
- software/firmware functions awareness
- factors affecting field versus workshop repair costs
- scheduling minor/major repair activities and downtime
- implications of temporary repairs
- use of system knowledge and history
- data interpretation - expected versus actual
- feedback to design/production/installation processes
- subsystems and system structures
- system signals/status indicators
- known failure modes and trends
- action threshold warnings versus catastrophic failure
- component ratings/upgrades
- disassembly/reassembly techniques and care
- relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g. improved productivity and quality.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRTS25 Maintain and test and metering schemes

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 testing of metering schemes and includes isolation, inspection, monitoring, testing, adjustment; and repair, refurbishment and/or overhaul and functional checks on schemes, including ammeters, voltmeters, wattmeters, volt-ampere reactive (VAR) meters and energy metering. It also includes the understanding of the purpose of the testing so as to prove accuracy and suitability of the metering for the required task.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS29 Develop power systems secondary isolation instructional documents

Competency Field

Testing

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 for the testing and maintenance of metering schemes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of metering schemes, are reviewed and determined
	1.2 Purpose of the testing and maintenance of metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the testing and maintenance of metering schemes are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance

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		criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing and maintenance of metering schemes	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Testing and maintenance of metering schemes decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the testing and maintenance of metering schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

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		an agreed timeframe according to requirements
	2.7	Testing and maintenance of metering schemes is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the testing and maintenance of metering schemes	**3.1**	Final inspections of the testing and maintenance of metering schemes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the testing and maintenance of metering schemes documents are issued and records are updated 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.

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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 UETTDRTS25A Maintain and test and metering schemes.

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 UETTDRTS25 Maintain and test and metering schemes

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
- demonstrating, on at least three (3) occasions, testing accuracy to established plans of at least three (3) schemes using the following equipment:
  - ammeter
  - voltmeter
  - wattmeter
  - VAR meter
  - energy meter*
  - (*Must do)
- 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:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- procedure to undertake a visual inspection of a scheme encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
  - requirements for the use of manuals, system diagrams/plans and drawings
  - identifying obvious deficiencies in operating to the standard functionality

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  - techniques in determining device malfunction
  - techniques in determining wiring defects
- procedures for the location and rectification of faults in electrical equipment up to 1000 volts alternating current (a.c.) and/or 1500 volts direct current (d.c.) encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
  - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, and fault-finding techniques and procedures
  - fundamental electrical concepts - effects of current, practical resistors, sources of electromagnetic field, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors and magnetism
  - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
  - fundamentals of single phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in phase splitting and universal type motors, and fault-finding procedures (prescriptive)
  - fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
  - fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)
- detailed operation of metering devices and principles encompassing:
  - common circuit configurations
  - meters and measurement principles
  - instrument transformer application
  - testing of metering systems and devices
  - implications of market operation
- detailed operation of metering test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurements of voltage, current, power, reactive power, phase angle, resistance, inductance, capacitance, impedance, frequency,

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harmonics and the use of transient and data logging devices

- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 Safe working on low-voltage electrical installations and equipment, or equivalent
  - safe use of tools and plant
  - safe use of ladders and elevated work platforms (EWP)
  - safe use of personal protective equipment (PPE)
  - hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards other hazardous areas
  - special situations
  - procedures for dealing with fires associated with electrical equipment
  - procedures for dealing with polychlorinated biphenyl (PCB)
  - electric shock victim rescue methods and procedures - basic first aid treatment for shock, burns and bleeding
  - purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardiopulmonary resuscitation (CPR) and combined application of EAR and ECC (purpose of each procedure and application)
  - components of a basic electrical circuit(s) – source, control, protection and load
  - types of circuit diagrams – symbols, conventions, interpretations and free sketches
  - types of circuit connections and functions - open circuit, closed circuit and short circuit
  - techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance; and using Ohms law
  - fundamental principles of electrical concepts - effects of current; practical resistors; sources of EMF; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - techniques in insulation resistance measurement and requirements
  - earthing principles and systems
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - methods for testing insulation resistance - continuity of prospective earthing conductor, and continuity between exposed conductive parts and the earthing system
  - methods of recognising acceptable test results for compliance with safety requirements
  - methods of recognising unacceptable test results requiring an appropriate qualified person to further investigate
  - cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, and colour codes
  - single and three phase systems and loads - number of active and live conductors required, line and phase voltage and typical loads
  - identification and rating of general appliances

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  - single phase induction motors - motor identification, motor ratings and direction of rotation
  - three phase induction motors - motor identification, motor ratings and direction of rotation
  - single and three phase heaters - types of heaters, heater identification and heater ratings
  - electrical distribution arrangement - power systems within premises, and purpose of switchboards/distribution boards (residual current devices and earth-leakage circuit breaker (ELCBs))
  - circuit isolation and protection devices
  - isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulations, codes of practice and procedures
  - disconnection procedures, practices and requirements
  - types of replacement equipment
  - methods of ensuring equipment is safe to connect to supply
  - methods of reconnection procedures, practices and requirements
  - methods of return equipment to service
- effects of harmonics encompassing:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators, motors and quality of supply
- procedures for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for, avoidance of further damage
  - interpretation of specific test results - cause/effect
  - techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution; diagnostic software; requirements for the use of manuals, system diagrams/plans, drawings and handbooks; and specifications and fault pathways
  - software/firmware functions awareness
  - factors affecting field versus workshop repair costs
  - scheduling minor/major repair activities and downtime
  - implications of temporary repairs
  - use of system knowledge and history
  - data interpretation, expected versus actual
  - feedback to design/production/installation processes
  - subsystems and system structures
  - system signals/status indicators
  - known failure modes and trends
  - action threshold warnings versus catastrophic failure
  - component ratings/upgrades

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- disassembly/reassembly techniques and care
- relative costs of repair and replacement - remaining life, ongoing maintenance, and additional benefits of replacement equipment, e.g. improved productivity and quality.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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
- 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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UETTDRTS26 Commission power systems metering schemes

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 commissioning of metering schemes and includes isolation, inspection, monitoring, testing and adjustment; and repair, refurbishment and/or overhaul and function checks on schemes including ammeters, voltmeters, wattmeters, volt-ampere reactive (VAR) meters and energy metering. It also includes an emphasis on ensuring that the metering is connected into the power system safely and correctly and that it returns valid information.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS25 Maintain and test and metering schemes

UETTDRTS29 Develop power systems secondary isolation instructional documents

Competency Field

Testing

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 for the commissioning of metering schemes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of metering schemes, are reviewed and determined
	1.2 Purpose of the commissioning of metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the commissioning of metering schemes are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures on policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance

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		criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of metering schemes	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Commissioning of metering scheme decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the commissioning of metering schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

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	an agreed timeframe according to requirements
	2.7 Testing of the commissioning of metering schemes is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the commissioning of metering schemes	**3.1** Final inspections of the commissioning of metering schemes are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the commissioning of metering schemes documents are issued and records are updated 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.

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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 UETTDRTS26A Commission power systems metering schemes.

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 UETTDRTS26 Commission power systems metering schemes

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
- demonstrating commissioning metering schemes, on at least three (3) occasions, testing accuracy to established plans of at least three (3) schemes using the following equipment
  - ammeter
  - voltmeter
  - wattmeter
  - VAR meter
  - energy meter*
  - (*Must do)
- 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:

- installation of metering and control equipment encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements pertaining to the installation and maintenance of energy meters and associated equipment
  - types of meters - kilowatt-hour meters single and polyphase, demand meters, recording meters and electronic recording metering system summators
  - installation and removal methods - direct connection and plug in method, and enterprise specific
  - types of associated equipment and accessories - meter boards, service fuse, links, contactors, time switch and audio frequency injection relay
  - testing procedures - safety testing and polarity testing

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- commissioning procedures associated with relevant equipment encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques and close out 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 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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UETTDRTS27 Perform accuracy checks on power systems instrument transformers

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 undertaking accuracy checks on instrument transformers and includes proving their functionality. It also includes both current and voltage instrument transformers having various operating principles, which are designed for metering, protection, monitoring or control usage. It also encompasses tasks associated with the isolation from other secondary circuits, inspection, measurement of excitation curves, measurement of phase and ratio errors and comparison of results with previous historical results and/or published specifications.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Testing

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 for accuracy checks on instrument transformers	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the performance of accuracy checks on instrument transformers, are reviewed and determined
	1.2 Purpose of the performance of accuracy checks on instrument transformers is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the performance of accuracy checks on instrument transformers are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance

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		criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out accuracy checks on instrument transformers	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Performance of accuracy checks on instrument transformer decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the performance of accuracy checks on instrument transformers are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

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	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Accuracy checks on instrument transformers are undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the performance of accuracy checks on instrument transformers	**3.1**	Final review of test results on instrument transformers is undertaken to ensure they comply with all requirements and includes all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the performance of accuracy checks on instrument transformers documents are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS27A Perform accuracy checks on power systems instrument transformers.

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 UETTDRTS27 Perform accuracy checks on power systems instrument transformers

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 five (5) accuracy checks on instrument transformers and incorporating all of the following:
  - isolation from other secondary circuits
  - inspection
  - measurement of excitation curves
- measuring phase and ratio errors on all of the following:
  - current transformers
  - voltage transformers
- 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:

- 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

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  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities

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  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements such as WHS/OHS and electrical safety
  - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
  - methods of conducting audits on correct access authority procedures
  - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
  - issue and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles, including switching authorisation procedures, encompassing:
  - 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
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, Safety procedures and precautions, safe approach distances
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
  - 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
  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorization - 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 permit authorities, requirements for team switching and procedures for coordination of operations

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    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- detailed operation of instrument transformers encompassing:
    - voltage and current transformer principles and terminology
    - types and classes of current transformers
    - constructions of current transformers
    - characteristics of current transformers
    - testing of current transformers
    - types and categories of voltage transformers
    - constructions of voltage transformers
    - characteristics of voltage transformers
    - testing of voltage transformers
- protection schemes encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
    - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
    - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
    - operation of over current protection equipment used on distribution systems
    - operation of automatic circuit reclosers (ACR) and their time-current characteristics
    - types and characteristics of overcurrent relays
    - coordination methods of a distribution feeder protection scheme
    - earth fault protection used on a distribution feeder
    - operation of a single wire earth return (SWER) system
- extra high voltage (EHV) generator control systems encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
    - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
    - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
    - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
    - EHV generator set and control system to EHV distribution assets.

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
- 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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UETTDRTS28 Repair, test and calibrate protection relays and meters

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 repair, calibration and testing of various types of protection relays. These can include electromechanical, analogue, digital electronic and numerical devices. It also involves finding and replacing faulty components, testing to manufacturer or user specifications and proving all functions of the devices under test.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Testing

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 for the testing, repair and calibration of protection relays and meters	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing, repair and calibration of protection relays and meters, are reviewed and determined
	1.2 Purpose of the testing, repair and calibration of protection relays and meters is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the testing, repair and calibration of protection relays and meters are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

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	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing, repair and calibration of protection relays and meters	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals as per established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Testing, repair and calibration decisions of protection relays and meters are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the testing, repair and calibration of protection relays and meters are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to

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		analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing, repair and calibration of protection relays and meters is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the testing, repair and calibration of protection relays and meters	**3.1**	Final review of test results of tested, repaired and calibrated protection relays and meters is undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the testing, repair and calibration of protection relays and meters documents are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS28A Repair, test and calibrate protection relays and meters.

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 UETTDRTS28 Repair, test and calibrate protection relays and meters

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
- using all of the following simple protection schemes:
  - auxiliary
  - overcurrent
  - timers
  - voltage
- using at least three (3) of the following intermediate protection devices:
  - inverse time delay overcurrent
  - voltage regulating relays
  - differential
  - pilot wire
- using at least two (2) of the following advanced protection schemes:
  - multi-zone impedance
  - multi-function feeder protection
  - phase comparison
  - digital current differential
- 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:

- procedures for the location and rectification of faults in electrical equipment up to 1000 volts alternating current (a.c.) and/or 1500 volts direct current (d.c.) encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical

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equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
    - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
    - fundamental electrical concepts - effects of current, practical resistors, sources of electromagnetic field, series, parallel and series-parallel circuits, electrical measurement, capacitors, inductors and magnetism
    - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
    - fundamentals of single phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in phase splitting and universal type motors and fault-finding procedures (prescriptive)
    - fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
    - fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)
- detailed operation of metering devices and principles encompassing:
    - common circuit configurations
    - meters and measurement principles
    - instrument transformer application
    - testing of metering systems and devices
    - implications of market operation
- detailed operation of fundamental test equipment encompassing:
    - care and safe use
    - operating principles
    - comparison of different operating principle meters used for the same purpose
    - accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence, and the use of oscilloscopes
- detailed operation of protection test equipment encompassing:
    - care and safe use
    - operating principles

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  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of timing, voltage, current, resistance, inductance, capacitance, impedance, frequency, phase angle, phase difference, and the use of primary, secondary and gas injection equipment
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of automatic circuit reclosers (ACR) and their time-current characteristics
  - types and characteristics of over-current relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) 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 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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UETTDRTS29 Develop power systems secondary isolation instructional documents

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 skills needed to develop secondary isolations. This will involve analysis of tripping and a thorough understanding of secondary voltage and current, direct current (d.c.), alarm, metering and communication circuits. It also involves accurate communication of this information in a format acceptable to the operating or testing authority.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Testing

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 for the development of secondary isolation instructional documents	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the development of secondary isolation instructional documents, are reviewed and determined
	1.2 Purpose of the development of secondary isolation instructional documents is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the development of secondary isolation instructional documents are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

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	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the development of secondary isolation instructional documents	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Development of secondary isolation instructional document decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the development of secondary isolation instructional documents are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to

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		analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the development of secondary isolation instructional documents is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the development of secondary isolation instructional documents	**3.1**	Final inspections of the development of secondary isolation instructional documents are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the development of secondary isolation instructional documents are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS29A Develop power systems secondary isolation instructional documents.

Links

UET Training Package Companion Volume Implementation Guide is found in VETNe - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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Assessment Requirements for UETTDRTS29 Develop power systems secondary isolation instructional documents

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 secondary isolation instructional documents for at least four (4) of the following substation equipment:
  - bus protection
  - high impedance bus protection
  - feeder/line protection
  - transformer protection
  - earth fault protection
  - backup protection
  - pilot wire protection
- 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:

- 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

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systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assess resources to establish and maintain WHS/OHS management systems
- generation systems encompassing:
    - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
    - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
    - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
    - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
    - characteristics of a transmission, distribution and rail system - principal components, typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
    - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
    - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
    - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
    - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
    - auxiliary equipment used on transformers - function and basic operation of equipment
    - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
    - description, purpose and characteristics of a reactors
- HV generator control systems encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
    - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
    - techniques in the installation of generator sets control systems - synchronising of generator control systems onto and off the network without interruption to supply, estimation of HV load and assessing the appropriateness of the generator
    - operating a generator in parallel to a single HV job - overhead systems, indoor systems,

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customer installations and kiosk substations
    - HV generator set and control system to HV distribution assets
- electrical equipment fundamentals used in the powerline industry encompassing:
    - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of electrical equipment (HV and low voltage (LV) equipment)
    - characteristics, capabilities and application of powerline electrical equipment
    - safety precautions with regards to using electrical equipment
    - techniques in pre-use inspection on the serviceability of electrical equipment
    - techniques in the general maintenance, care and storage of electrical equipment
    - identifying hazards, assessing and controlling risks associated with the use of electrical equipment
- coordinating access authority procedures encompassing:
    - specific enterprise processes, policies and procedures to be followed
    - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
    - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
    - techniques in the effective utilisation of available resources
    - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
    - techniques in facilitating and coordinating the delivery and issuing of access authorities
    - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issue and receipt of operating agreements
- HV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions,

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and safe approach distances (SAD)
    - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- LV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permit authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- secondary switching/isolation principles and sheet preparation encompassing:
    - techniques in performing and demonstrating correct sequence of isolation and/or restoration - communications with appropriate authorities, ensuring adequate protection remains in service to provide plant protection, reading and interpreting drawings for switching/isolating, and sheet/instruction preparation
- protection schemes encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
    - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
    - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
    - operation of overcurrent protection equipment used on distribution systems
    - operation of automatic circuit reclosers (ACR) and their time-current characteristics
    - types and characteristics of overcurrent relays
    - coordination methods of a distribution feeder protection scheme
    - earth fault protection used on a distribution feeder
    - operation of a single wire earth return (SWER) system
- extra high voltage (EHV) generator control systems encompassing:
    - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator

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- safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
- techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
- operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
- EHV generator set and control system to EHV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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UETTDRTS30 Design power systems secondary isolation instructional documents

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 skills needed to design secondary isolations. This will involve analysis of tripping and a thorough understanding of secondary voltage and current, direct current (d.c.), alarm, metering and communication circuits. It also involves accurate communication of this information in a format acceptable to the operating or testing authority.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies,

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procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Testing

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 for the design of secondary isolation instructional documents	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the design of secondary isolation instructional documents, are reviewed and determined
	1.2 Purpose of the design of secondary isolation instructional documents is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the design of secondary isolation instructional documents are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures

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	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the design of secondary isolation instructional documents	**2.1** Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2 WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3 Design of secondary isolation instructional document decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4 Mathematical and/or engineering models of the design of secondary isolation instructional documents are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6 Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

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	specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7 Testing of the design of secondary isolation instructional documents is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the design of secondary isolation instructional documents	**3.1** Final inspections of the design of secondary isolation instructional documents are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the design of secondary isolation instructional documents are issued and records are updated 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

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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 UETTDRTS30A Design power systems secondary isolation instructional documents.

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 UETTDRTS30 Design power systems secondary isolation instructional documents

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
- designing secondary isolation instructional documents for at least four (4) of the following substation equipment:
  - bus protection
  - high impedance bus protection
  - feeder/line protection
  - transformer protection
  - earth fault protection
  - backup protection
  - pilot wire protection
- 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:

- 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

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systems
    - analysis of relevant data and evaluation of WHS/OHS system effectiveness
    - assess resources to establish and maintain WHS/OHS management systems
- secondary switching/isolation principles and sheet preparation encompassing:
    - techniques in performing and demonstrating correct sequence of isolation and/or restoration - communication with appropriate authorities, ensuring adequate protection remains in service to provide plant protection, and reading and interpreting drawings for switching/isolating, sheet/instruction preparation.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRTS31 Maintain, test and commission power systems voltage regulating 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 covers the maintenance, testing and commissioning of distribution field devices to relevant standards, including voltage regulators, automatic circuit reclosers (ACR) control boxes, line capacitors and associated communication devices. It includes communicating with the operating authority, testing, clearing after test and energisation using techniques that are acceptable to the operating authority.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Testing

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 and coordinate the maintenance, testing and commissioning of distribution field devices	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance testing and commissioning of distribution field devices, are reviewed and determined
	1.2 Purpose of the work is established and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Established organisational procedures, policies and specifications for the work are obtained or established with appropriate personnel
	1.4 Equipment/tools and personal protective equipment (PPE) are selected and coordinated based on specified requirements and established procedures
	1.5 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures

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	1.6	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.7	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.8	Resources, including personnel, equipment, tools and PPE required for the job are identified, scheduled and coordinated, and confirmed in safe and technical working order
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
2 Carry out and coordinate the maintenance, testing and commissioning of distribution field devices	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to avoid the incidence of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Maintenance, testing and commissioning decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical models of the distribution system are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance

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		specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete and coordinate the maintenance, testing and commissioning of distribution field devices	**3.1**	Final inspections of the work are undertaken to ensure it complies with all requirements and includes all specifications and documentation needed to complete the brief
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of test documents are issued and records updated 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 UETTDRTS31A Maintain, test and commission power systems voltage regulating equipment.

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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 UETTDRTS31 Maintain, test and commission power systems voltage regulating 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
- testing, on two (2) occasions, at least two (2) of the following:
  - automatic circuit recloser (ACR) control box and recloser functions
  - line capacitor controller
  - voltage regulating relay and voltage regulator
- commissioning, on two (2) occasions, at least two (2) of the following:
  - ACR control box and recloser
  - line capacitors
  - voltage regulating relay and voltage regulator
- 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:

- 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

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  - analysis of relevant data and evaluation of WHS/OHS system effectiveness
  - assess resources to establish and maintain WHS/OHS management systems
- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location, and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components, typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including radial, parallel and ring main feeders and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers, operation under load/no-load conditions, types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and coordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures

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- techniques in facilitating and coordinating the delivery and issuing of access authorities
- techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management procedures, and regulatory requirements, such as WHS/OHS and electrical safety
- techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
- methods of conducting audits on correct access authority procedures
- process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
- issue and receipt of operating agreements

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles including switching authorisation procedures to an extent indicated by the following aspects:
  - 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
  - types and characteristics of HV systems and equipment to be switched
  - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances (SAD)
  - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permit authorities, requirements for team switching and procedures for coordination of operations
  - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
  - 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
  - types and characteristics of LV systems and equipment to be switched
  - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for

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coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures
- enterprise-specific equipment installation procedures encompassing:
    - 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 personal protective equipment (PPE), responsibilities and protocols and safe working clearances
    - remote and local operating principles and conventions
- principles of power transformer construction and operations encompassing:
    - transformer types - shell, core, auto, double wound, three phase, single phase and combinations of these types, step up and step down transformers, and transmission and generation types
    - reactor types - shunt and series, applications and design considerations
    - iron circuit characteristics - steel types, losses and techniques used to eliminate excess eddy currents and other circulating currents
    - winding configurations and construction techniques - helical, spiral, disc and interleaved disc types
    - insulation methods and techniques - fully insulated windings and graded insulation techniques, oil filled and gas filled power transformers
    - transformer and reactor ratings, losses and efficiency - equivalent circuits and vector relationships, and impedance percent
    - nameplate details - basic impulse level (BIL), tapping winding detail, physical layout, cooling ratings and physical details
    - transformer and reactor cooling types and their effects on design and rating
    - transformer and reactor auxiliaries - temperature indicators, over pressure devices and control systems
    - winding configurations - star-star, star-delta, star-zigzag, nomenclature and common methods of diagrammatic representation of winding configuration
    - operating constraints as single units and in parallel
    - tapping windings - placement issues, tapping range, on-load tap changer (OLTC) versus off load tap changer techniques, types in use (high speed resistor, reactor and vacuum

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types, Jansen mechanisms, dead tank and live tank types), and control system characteristics
    - HV bushing selection – type, insulation system used, rating, BIL, selection criteria and testing considerations
- principles of power transformer construction and operations encompassing:
    - 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 (SVC) 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
- principles of power transformer high speed OLTC encompassing:
    - selector types and applications for HV power transformers
    - diverter switch types and applications for HV power transformers, including live tank, dead tank, resistor type, reactor type, vacuum type, pennant flag and pennant cycle
    - ratings and construction principles
    - operating mechanism types, stored energy systems and associated control systems
    - operating principles and operating sequences of selectors and diverters
    - measurement requirements, including contacts, differential wear, transition resistors and transient protection devices, rotation lag, out of sequence controls and end-of-life unit and component assessment
    - online diagnostic tools and devices
    - ancillary equipment, including online filters, over pressure relays and devices
    - testing requirements, including cycle timing, differential delay, energy accumulator mechanical and operational tests, and control system functional tests
    - safety precautions when testing and maintaining HV power transformer OLTC - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE
- circuit breaker construction principles encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to circuit breakers
    - requirements for the use of manuals, circuit breaker diagrams/plans and drawings
    - types, characteristics and capabilities of HV substation circuit breakers installed
    - use, characteristics and capabilities of specialised tools and equipment

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- identification of components within the circuit breaker and associated control housings
- identification of energy sources within the circuit breaker and associated control housings
- identification of insulation paths within the circuit breaker
- types and characteristics of operating mechanisms
- types and characteristics of interrupter chambers
- safety precautions when constructing circuit breakers - safe working practices and procedures; identification of hazards; assessment and control of WHS/OHS risks; types, selection, maintenance and use of PPE

- synchronous condenser principles encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to synchronous condensers
  - requirements for the use of manuals, substation diagrams/plans and drawings
  - types, characteristics and capabilities of synchronous condensers installed
  - identification of components within the synchronous condensers and associated control housings
  - use, characteristics and capabilities of specialised tools and equipment
  - enterprise-specific policies and procedures for synchronous condensers
  - techniques in evaluating serviceability of synchronous condensers operation
  - safety precautions when testing and measuring synchronous condensers - 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; safe working clearances and communicating worksite procedures
- operation and maintenance procedures associated with voltage regulation schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - principles of operation and operating sequences - voltage control, VAR control, live bus/dead bus synchronising checks, tap changer principles, requirements for parallel operations, settings and grading
  - techniques associated isolation requirements, enterprise maintenance requirements, setting checks, LV injections and electrical measurements
  - ancillary equipment - transducers, buswire schemes, tap position indicators, local/remote control systems and alarm systems
  - voltage regulation scheme types - electromechanical, micro-processor or combinations of both
- electrical equipment associated with distribution field device protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: ACR, gas switches, secondary injection tests, primary injection tests, trunked mobile radio (TMR), supervisory control and data acquisition (SCADA), remote control, overcurrent, earth fault, sensitive earth fault, inverse time curves, definite time curves, tripping, reclose, direct current (d.c.) supplies, alternating current (a.c.) supplies and

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alarms)

- voltage control techniques encompassing:
  - conditions leading to voltage collapse
  - effects on system of HV and LV
  - voltage control devices - voltage regulators applied to generators and synchronous phase modifiers; electromagnetic voltage regulators; series and parallel capacitors; OLTC transformers; and static VAR compensators (SVC) , such as saturated reactor compensators, thyristor controlled reactor compensators and combined systems
  - production of harmonics and methods of harmonic control
  - location of voltage control devices within the system
- voltage control devices encompassing:
  - typical devices applications and capacities
  - estimation of rating of VAR regulating devices using graphical techniques
- transient over voltages encompassing:
  - causes and effects of transient over voltages - switching transients and lightning transients, and effects on plant items
  - control techniques and systems - surge diverters, shield wires and circuit breaker arc control
  - insulation systems - insulation systems, insulation coordination and insulation grading
- commissioning procedures associated with relevant equipment encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques, close out requirements
- procedures for the location and rectification of faults in electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - relationship of WHS/OHS to the location and rectification of faults in electrical equipment - acts and regulations, identification of personal safety, workplace hazards, working with electrically operated tools and equipment, emergency first aid/resuscitation, rescue from a live electrical situation, and enterprise policies and procedures
  - types of drawings - differentiation between symptoms, faults and causes in malfunctioning equipment, fault-finding techniques and procedures
  - fundamental electrical concepts - effects of current; practical resistors; sources of electromagnetic field; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - fundamentals of general appliances - basic principles of appliances (non-mathematical), appliance identification, appliance ratings, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in appliances and fault-finding procedures (prescriptive)
  - fundamentals of single phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, basic principles of operation of

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control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, test equipment, safe testing procedures, including continuity, fault types in phase splitting and universal type motors, and fault-finding procedures (prescriptive)

- fundamentals of three phase induction motors - basic principles of operation (non-mathematical), motor identification, motor ratings, motor starter principles, basic principles of operation of control equipment and protection devices, fault conditions and symptoms, safe isolation procedures, safe testing procedures and fault-finding procedures (prescriptive)
- fundamentals of single and three phase electrical heaters - basic principles of operation, types of electrical heaters, electrical heater identification, electrical heater ratings, basic principles of operation of control and protection devices, fault conditions and symptoms, safe testing procedures and fault-finding procedures (prescriptive)

- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000 volts a.c. and/or 1500 volts d.c. encompassing:
  - safe electrical work practices and procedures according to standards such as AS/NZ 4836:2001 Safe working on low-voltage electrical installations and equipment, or equivalent
  - safe use of tools and plant
  - safe use of ladders and elevated work platforms (EWP)
  - safe use of PPE
  - hazards in the (electrical) work environment - shock hazards, fire hazards, chemical hazards and other hazardous areas
  - special situations
  - procedures for dealing with fires associated with electrical equipment
  - procedures for dealing with PCBs
  - electric shock victim rescue methods and procedures - basic first aid treatment for shock, burns and bleeding
  - purpose of each procedure and application - expired air resuscitation (EAR), external cardiac-compression (ECC), cardiopulmonary resuscitation (CPR), combined application of EAR and ECC (purpose of each procedure and application)
  - components of a basic electrical circuit(s) – source, control and protection, load
  - types of circuit diagrams – symbols, conventions, interpretations and free sketches
  - types of circuit connections and functions - open circuit, closed circuit and short circuit
  - techniques in basic electrical measurement - use of multimeters; use of ammeter; use of voltage measuring and indicating devices; testing of measuring instruments; care of measuring instruments; voltage, current and resistance measurement; estimating values of voltage, current and resistance and using Ohms law
  - fundamental principles of electrical concepts - effects of current; practical resistors; sources of electromagnetic field; simple practical circuit; series, parallel and series-parallel circuits; electrical measurement; capacitors; inductors and magnetism
  - techniques in insulation resistance measurement and requirements
  - earthing principles and systems
- disconnection and reconnection procedures for fixed wiring electrical equipment up to 1000

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volts a.c. and/or 1500 volts d.c. encompassing:

- methods for testing insulation resistance - continuity of prospective earthing conductor, continuity between exposed conductive parts and the earthing system
- methods of recognising acceptable test results for compliance with safety requirements
- methods of recognising unacceptable test results requiring an appropriate qualified person to further investigate
- cable types and conductor termination methods and techniques - conductors solid, stranded and flexible, and colour codes
- single and three phase systems and loads - number of active and live conductors required, line and phase voltage, and typical loads
- identification and rating of general appliances
- single phase induction motors - motor identification, motor ratings and direction of rotation
- three phase induction motors - motor identification, motor ratings and direction of rotation
- single and three phase heaters - types of heaters, heater identification and heater ratings
- electrical distribution arrangement - power systems within premises and purpose of switchboards/distribution boards (residual current devices and earth-leakage circuit breakers)
- circuit isolation and protection devices
- isolation procedures - work clearance, testing for voltage, lock-off and tagging, techniques in isolation and tagging, regulation, codes of practice and procedures
- disconnection procedures, practices and requirements
- types of replacement equipment
- methods of ensuring equipment is safe to connect to supply
- methods of reconnection procedures, practices and requirements
- methods of return equipment to service

- effects of harmonics encompassing:
  - characteristics and effects of harmonics on protection device functions/malfunction
  - effects of harmonics on transformers, generators, motors and quality of supply
- procedures for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for avoidance of further damage
  - interpretation of specific test results -cause/effect
  - techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways
  - software/firmware functions awareness
  - factors affecting field versus workshop repair costs

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- scheduling minor/major repair activities and downtime
- implications of temporary repairs
- use of system knowledge and history
- data interpretation - expected versus actual
- feedback to design/production/installation processes
- subsystems and system structures
- system signals/status indicators
- known failure modes and trends
- action threshold warnings versus catastrophic failure
- component ratings/upgrades
- disassembly/reassembly techniques and care
- relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g. improved productivity and quality

- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of ACR and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) system
- extra high voltage (EHV) generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
  - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
  - EHV generator set and control system to EHV distribution assets.

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 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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UETTDRTS32 Conduct evaluation of power systems primary plant

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 commissioning and maintenance testing requirements for primary plant and equipment. It includes both the practical application of the tests and analysis of results, covering, but not limited to; applied high voltage (HV) testing and induced HV testing, ratio, polarity, winding resistance, impedance, dielectric loss angle, partial discharge and watts loss insulation resistance and transformer vector group. It encompasses a complete understanding of the nature of the tests being conducted and the ability to conduct the tests in a safe manner.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS29 Develop power systems secondary isolation instructional documents

Competency Field

Testing

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 for the testing of primary plant	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing of primary plant systems, are reviewed and determined
	1.2 Purpose of the testing of primary plant is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the testing of primary plant are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance

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		criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing of primary plant	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Testing of primary plant decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the testing of primary plant are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within

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	an agreed timeframe according to requirements
	2.7 Testing of primary plant is undertaken according to requirements and established procedures
	2.8 Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9 Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11 Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the testing of primary plant	**3.1** Final inspections of the primary plant are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4 Approved copies of the testing of primary plant documents are issued and records are updated 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.

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Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS32A Conduct evaluation of power systems primary plant.

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 UETTDRTS32 Conduct evaluation of power systems primary plant

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
- completing five (5) of the following tests on primary plant – transformers (note: at least two (2) (*) must be included):
  - *direct current (d.c.) high voltage (HV) tests
  - *alternating current (a.c.) HV tests
  - *induced HV tests
  - ratio tests
  - polarity tests
  - winding resistance tests
  - impedance tests
  - insulation resistance tests
  - transformer vector group tests
  - winding temperature indicator tests
  - alarm tests
  - neutral current transformer (CT) tests
- complete five (5) of the following tests on primary plant – circuit breakers (note: at least two (2) (*) must be included):
  - profiling and contact timing
  - *a.c. HV tests
  - function tests
  - minimum voltage operation tests
  - insulation resistance tests
  - contact resistance tests
  - auxiliary contact tests
  - alarm tests

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- complete at least three (3) of the following tests on primary plant – capacitor banks
  - cell capacitance measurement
  - neutral CT tests
  - balance tests
  - insulation resistance
- 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:

- detailed operation of fundamental test equipment encompassing:
  - care and safe use
  - operating principles
  - comparison of different operating principle meters used for the same purpose
  - accuracy and loading effects of meters - measurement of voltage, current, power, resistance, insulation resistance, impedance and phase sequence, and the use of oscilloscopes
- primary plant testing encompassing:
  - transformers - d.c. HV tests, a.c. HV tests, HV tests, ratio tests, polarity tests, winding resistance tests, impedance tests, insulation resistance tests, transformer vector group test, winding temperature indicator test, alarm tests and neutral CT tests
  - circuit breakers - d.c. HV tests, a.c. HV tests, induced HV tests, function tests, operation timing, minimum voltage operation test, insulation resistance test, contact resistance test, auxiliary contact test and alarm tests
  - capacitor banks - d.c. HV tests, a.c. HV tests, induced HV tests, neutral CT tests, balance tests and insulation resistance.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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:

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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, 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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UETTDRTS33 Undertake power systems project management of substation augmentation and maintenance

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 coordination, planning and supervision of projects, including but not limited to, commissioning of new plant and equipment, maintenance projects and retrofit works. It includes coordinating and facilitating the work of others and the collation of the relevant outcomes and results and involves an overview of both primary and secondary works to ensure completion of all aspects of the project, and must encompass at least 20 identifiable tasks.

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

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Protection Relays and Meters Pathway Unit Group

UETTDRTS28 Repair, test and calibrate protection relays and meters

Metering Pathway Unit Group

UETTDRTS25 Maintain and test and metering schemes

UETTDRTS26 Commission power systems metering schemes

UETTDRTS29 Develop power systems secondary isolation instructional documents

Primary Plant Pathway Unit Group

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS32 Conduct evaluation of power systems primary plant

Protection Systems Pathway Unit Group

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS35 Maintain complex network protection and control systems

Competency Field

Testing

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 for the project management of substation augmentation and	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the undertaking of project management of substation

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maintenance		augmentation and maintenance, are reviewed and determined
	1.2	Purpose of the undertaking of project management of substation augmentation and maintenance is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures on policies and specifications for the undertaking of project management of substation augmentation and maintenance are obtained or established with appropriate personnel
	1.4	Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures and policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out project management of substation augmentation and maintenance	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures

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	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Undertaking of project management of substation augmentation and maintenance decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the undertaking of project management of substation augmentation and maintenance are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of substation augmentation and maintenance is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the project management of substation	**3.1**	Final inspections of substation augmentation and maintenance are undertaken to ensure they comply with

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augmentation and maintenance		all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the project management of substation augmentation and maintenance documents are issued and records are updated 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 UETTDRTS33A Undertake power systems project management of substation augmentation and maintenance.

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 UETTDRTS33 Undertake power systems project management of substation augmentation and maintenance

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
- managing three (3) projects (encompassing at least twenty (20) identifiable tasks) including installation, testing and commissioning stages
- applying project management skills including all of the following:
  - work planning
  - coordination of labour resources
  - on-site supervision
  - controlling quality
  - use of quality systems
  - planned versus actual comparisons
  - communication with designers
  - control of materials
  - substation primary plant
  - substation secondary equipment
  - substations civil projects
- 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:

- system components and layouts encompassing:
  - distribution system layouts - overhead/underground, urban/rural, high voltage (HV) customers, high rise building systems, three phase lines, single phase lines, single wire

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earth return (SWER) systems, spur, parallel and ring systems, and typical substation types
    - transmission system layouts - lines, buses, transformers and cables; line/bus layouts, including single, double, ring and breaker and half systems; and HV crossing methods
- alternating current (a.c.) transmission system components encompassing:
    - support structures and reasons for selection
    - insulators and reasons for selection
    - conductors and reasons for selection
    - vibration management systems and principles
    - line ratings based on voltage, span, tension and temperature
- procedure to undertake a visual inspection of a scheme encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
    - requirements for the use of manuals, system diagrams/plans and drawings
    - identify obvious deficiencies in operating to the standard functionality
    - techniques in determining device malfunction
    - techniques in determining wiring defects
- commissioning procedures associated with relevant equipment encompassing:
    - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
    - requirements for the use of commissioning manuals, system diagrams/plans and drawings
    - techniques in commissioning procedures – planning, policy, testing techniques and close out 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 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.

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UETTDRTS34 Install and maintain power system communication 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 covers the installation and maintenance of network communication systems and includes the isolation and functional checks of discrete and interdependent communication schemes associated with power systems. It also encompasses power line carrier equipment, protection signalling equipment, radio systems and telephone systems, VF systems, multiplexing systems and fibre optic systems, but does not include wiring.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

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UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Testing

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 for the installation and maintenance of power system communication equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the installation and maintenance of power system communication equipment systems, are reviewed and determined
	1.2 Purpose of the installation and maintenance of power system communication equipment is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the installation and maintenance of power system communication equipment are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are established from organisational established procedures and policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance

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		criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the installation and maintenance of power system communication equipment	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Installation and maintenance of power system communication equipment decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical/engineering models of the installation and maintenance of power system communication equipment are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures

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	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of the installed and/or maintained power system communication equipment is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the installation and maintenance of power system communication equipment	**3.1**	Final inspections of the installed and/or maintained power system communication equipment are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the installation and maintenance of power system communication equipment documents are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS34A Install and maintain power system communication 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 UETTDRTS34 Install and maintain power system communication 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
- completing maintenance testing on substation communications equipment, including isolation and functional checks on at least three (3) of the following systems:
  - supervisory cables
  - power line carrier systems
  - protection signalling equipment
  - telephone systems
  - VF systems
  - fibre optics
- completing commissioning tests on substation communications equipment, including isolation and functional checks on at least three (3) of the following systems:
  - supervisory cables
  - power line carrier systems
  - protection signalling equipment
  - telephone systems
  - VF systems
  - fibre optics
- 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:

- generation systems encompassing:
  - methods of generating electricity - types of power stations and reasons for their location,

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and layout of thermal and hydroelectric power stations
  - relationship between power control and load requirements - operating speeds for thermal and hydroelectric generating sets, typical generator voltage levels and output ratings
  - the purpose and features of typical types of co-generation systems
- transmission, distribution and rail systems encompassing:
  - relationship between the transmission, distribution and rail/tram system within an overall power system - different organisations responsible for generation, transmission, distribution and rail/tram; how they correlate and their functions
  - characteristics of a transmission, distribution and rail system - principal components; typical voltage levels and methods of transmission and distribution, including grid type transmission systems, radial, parallel and ring main feeders
  - relationship between an overhead and underground supply systems within an overall power system - advantages/disadvantages, applications and the basic steps for planning and installing an overhead and underground distribution system
  - single line drawings and layouts - drawings and layouts of transmission and distribution systems, including, radial, parallel and ring main feeders; and the high voltage (HV) equipment associated with substations
- substations, power transformers and reactors encompassing:
  - relationship between the substations within an overall power system - purpose, location in relation to load centres, layout of HV equipment within the substation and auxiliary equipment
  - characteristics of a power transformer - basic construction of distribution transformers; operation under load/no-load conditions; types and basic operation of tap changing switches, including solid state types, efficiency and cooling
  - auxiliary equipment used on transformers - function and basic operation of equipment
  - maintenance of a power transformer - basic connections, restrictions to parallel operation, problems and remedies associated with harmonics, and testing and fault-finding procedures
  - description, purpose and characteristics of a reactors
- coordinating access authority procedures encompassing:
  - specific enterprise processes, policies and procedures to be followed
  - processes of consultation, negotiation and c-ordination - clear and concise instructions and information, methods for the encouragement of feedback and contributions of information and ideas, and responsibilities of members of the team
  - techniques in analysing, planning, coordinating and organising work for a safe outcome and according to statutory requirements and regulations
  - techniques in the effective utilisation of available resources
  - techniques in the development of an access authority/permit and/or access authority/permit issuing procedures
  - techniques in facilitating and coordinating the delivery and issuing of access authorities
  - techniques in gathering, collating and confirming data on different worksites - electrical network diagrams for the specific worksite, earth access authorities, safe working area, work to be carried out in confined space or in hazardous environment, specific outsourcing procedures, specific hazard identification, risk classification and management

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procedures, and regulatory requirements, such as WHS/OHS and electrical safety
    - techniques in the receiving and coordinating the cancellation of access authorities in readiness for restoration
    - methods of conducting audits on correct access authority procedures
    - process of issuing of other access authorities for work permits - working in confined space, if required, coordination of access authorities, and engaging and briefing contractors on electrical and other work
    - issue and receipt of operating agreements
- principles of statutory and safety considerations encompassing:
    - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on HV
    - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- HV system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of HV systems and equipment to be switched
    - procedures for obtaining correct HV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, and safe approach distances (SAD)
    - responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in HV system switching - pre-switching checks, switching operational procedures, isolation procedures and proving dead de-energised, earthing procedures, switching operational procedures, emergency fault procedures and energisation procedures
- low voltage (LV) system switching principles, including switching authorisation procedures, encompassing:
    - 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
    - types and characteristics of LV systems and equipment to be switched
    - procedures for obtaining correct LV switching authorisation - identification of WHS/OHS hazards, assessing and controlling risks, safety procedures and precautions, SAD, responsibilities and protocols, identifying switching resources, procedures for obtaining electrical access permits authorities, requirements for team switching and procedures for coordination of operations
    - techniques in LV system switching - isolation procedures and proving dead, earthing procedures, pre-switching checks, switching operational procedures, emergency fault procedures and energisation procedures

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- enterprise-specific equipment installation procedures encompassing:
  - 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 personal protective equipment (PPE); responsibilities and protocols; and safe working clearances
  - remote and local operating principles and conventions
- detailed operation of communication devices and principles encompassing:
  - types of communication systems
  - interface to power system equipment
  - hardware configurations
  - testing of communication links
- procedure for the systematic fault isolation through the application of diagnostic techniques encompassing:
  - principles of analytical questioning
  - techniques in drawing valid conclusions from first observations
  - concepts of broad first-line testing
  - consideration of/responsibility for avoidance of further damage
  - interpretation of specific test results - cause/effect
  - techniques for isolation to appropriate level - half-split, module/function isolation (kernel technique), substitution, diagnostic software, requirements for the use of manuals, system diagrams/plans, drawings, handbooks, specifications and fault pathways
  - software/firmware functions awareness
  - factors affecting field versus workshop repair costs
  - scheduling minor/major repair activities and downtime
  - implications of temporary repairs
  - use of system knowledge and history
  - data interpretation - expected versus actual
  - feedback to design/production/installation processes
  - subsystems and system structures
  - system signals/status indicators
  - known failure modes and trends

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  - action threshold warnings versus catastrophic failure
  - component ratings/upgrades
  - disassembly/reassembly techniques and care
  - relative costs of repair and replacement - remaining life, ongoing maintenance, additional benefits of replacement equipment, e.g. improved productivity and quality
- protection schemes encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements applicable to protection schemes
  - types of protection schemes - reasons for use, application of protection zones around system elements and degree of protection
  - types of feeder protection equipment - overcurrent protection inverse time-current operating characteristics
  - operation of overcurrent protection equipment used on distribution systems
  - operation of automatic circuit reclosers (ACR) and their time-current characteristics
  - types and characteristics of overcurrent relays
  - coordination methods of a distribution feeder protection scheme
  - earth fault protection used on a distribution feeder
  - operation of a single wire earth return (SWER) system
- extra high voltage (EHV) generator control systems encompassing:
  - legislation, standards, codes, supply authority regulations and/or enterprise requirements pertaining to the operation of a portable generator
  - safety precautions specific to the synchronisation of generator sets - safe working policies, practices and procedures, and synchronising procedures
  - techniques in the installation of generator sets control systems - the synchronising of generator control systems onto and off the network without interruption to supply, estimation of EHV load and assessing the appropriateness of the generator
  - operating a generator in parallel to a single EHV job - overhead systems, indoor systems, customer installations and kiosk substations
  - EHV generator set and control system to EHV distribution assets.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, facilities, 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

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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UETTDRTS35 Maintain complex network protection and control 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 the maintenance of network protection and control systems in complex situations and includes isolation, inspection, monitoring, testing, adjustment and repair, refurbishment and/or overhaul and functional checks. It includes schemes from discrete and interdependent and also schemes, such as distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, supervisory control and data acquisition (SCADA), communications, harmonic control and point on wave.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UETTDREL11 Apply sustainable energy and environmental procedures

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UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

Competency Field

Testing

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 for the maintenance of network protection and control systems (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintenance of network protection and control systems (complex), are reviewed and determined
	1.2 Purpose of the maintenance of network protection and control systems (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the maintenance of network protection and control systems (complex) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with and/or directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing parameters are ascertained from organisational

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		established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the maintenance of network protection and control systems (complex)	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Maintenance of network protection and control systems (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the scheme are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate

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		authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network protection and control systems (complex) is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the maintenance of network protection and control systems (complex)	**3.1**	Final inspections of the network protection and control systems (complex) are undertaken to ensure they comply with all requirements and include all specifications and documentation needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the maintenance of network protection and control systems (complex) documents are issued and records are updated 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 UETTDRTS35A Maintain complex network protection and control 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 UETTDRTS35 Maintain complex network protection and control 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
- completing all of the following
  - isolating protection, control and alarms associated with complex protection and control schemes
  - calibrating complex protection and control relays
  - carrying out function tests (trips and alarms) on complex protection and control schemes
  - writing reports on performance of complex protection and control schemes
  - isolating ‘in service’ current transformers
- completing all of the following:
  - activities that address the correction of errors in network protection and control systems
- 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:

- principles of power transformer construction and operations encompassing:
  - applications of static reactive plant in high voltage (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

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  - 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 personal protective equipment (PPE)
- detailed operation of 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 and bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, current transformer connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, special considerations and digital systems
  - types of revenue metering
  - applications of supervisory control and data acquisition (SCADA)
  - 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 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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UETTDRTS36 Commission complex network protection and control 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 the commissioning of network protection and control systems in complex situations and includes isolation, inspection, monitoring, testing, adjustment and repair, refurbishment and/or overhaul and functional checks. It includes schemes from discrete and interdependent and also schemes, such as distance, differential, transformer differential, bus zone, bus overcurrent, revenue metering, current transformer accuracy, supervisory control and data acquisition (SCADA), communications, harmonic control, point on wave and high voltage (HV) plant testing.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

UEENEEE124A Compile and produce an energy sector detailed report

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

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UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS21 Maintain interdependent network protection and control systems

UETTDRTS22 Commission interdependent network protection and control systems

UETTDRTS29 Develop power systems secondary isolation instructional documents

UETTDRTS35 Maintain complex network protection and control systems

Competency Field

Testing

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 for the commissioning of network protection and control systems (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of network protection and control systems (complex), are reviewed and determined
	1.2 Purpose of the commissioning of network protection and control systems (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures on policies and specifications for the commissioning of network protection and control systems (complex) are obtained or established with appropriate personnel
	1.4 Testing procedures are discussed with/directed to

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		appropriate personnel in order to ascertain the project brief
	1.5	Testing parameters are established from organisational established procedures and policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of network protection and control systems (complex)	**2.1**	Circuit/systems modelling is used to evaluate alternative proposals in accordance with established procedures
	2.2	WHS/OHS and sustainable energy principles, functionality and practices to reduce the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.3	Commissioning of network protection and control systems (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.4	Mathematical and/or engineering models of the schemes are used to analyse the effectiveness of the finished project in accordance with requirements and established

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		procedures
	2.5	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Testing of network protection and control systems (complex) is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using acquired essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
	2.11	Strategic plans are developed incorporating organisation initiatives in accordance with established procedures
3 Complete the commissioning of network protection and control systems (complex)	**3.1**	Final inspections of the network protection and control systems (complex) are undertaken to ensure they comply with all requirements and include all specifications and documentations needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the commissioning of network protection and control systems (complex) documents are issued and records are updated in accordance with

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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 UETTDRTS36A Commission complex network protection and control 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 UETTDRTS36 Commission complex network protection and control 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
- commissioning of a protection and control system, including at least five (5) complex schemes
- 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:

- principles of statutory and safety considerations encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations and/or enterprise requirements associated with working on high voltage (HV)
  - particular reference to state and territory regulations - working near energised conductors, electrical access, heights, confined space, testing procedures and licensing rules
- electrical equipment associated with protection and control schemes encompassing:
  - types and applications of electrical equipment – characteristics, capabilities (schemes: overcurrent, frame leakage, cooling, buchholz, direct current (d.c.) supplies, restricted earth, sensitive earth fault, circuit breaker fail, reclose, d.c. frame leakage, CEL fail, under frequency load shed and earth fault)
- principles of isolation and tagging procedures associated with protection testing encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation, maintenance, isolation and tagging procedures
  - requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings

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  - techniques in documenting isolations
  - techniques in appropriate isolation and tagging procedures in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
  - techniques in the installation and maintenance procedures protection devices in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- maintenance and commissioning procedures associated with discrete protection schemes encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the maintenance and commissioning procedures
  - requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
  - techniques in maintenance and commissioning procedures – planning, policy and testing techniques
  - close out requirements
- relay manufacturer specifications encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of relay manufacturer specifications
  - requirements for the use of relay manufacturer manuals, system diagrams/plans and drawings
  - types, function and characteristics of specific relays - differences between specific relays used for the same functionality
- safe handling and/or disposing of insulation materials used in power distribution devices, which are potential environmental pollutants encompassing:
  - 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 personnel protective equipment (PPE); permit to work systems and isolation procedures; types and function of specialised equipment; safe working practices when using specialised equipment; and emergency response and rescue including first aid e
  - techniques in the handling and disposing of insulation materials - polychlorinated biphenyl (PCB), asbestos, insulating oil and sulphur hexafluoride (SF6) gas
- procedure to undertake a visual inspection of a scheme encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with visual inspection procedures of a scheme
  - requirements for the use of manuals, system diagrams/plans and drawings

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  - identifying obvious deficiencies in operating to the standard functionality
  - techniques in determining relay malfunction - targeting
  - techniques in determining wiring defects
- operation and maintenance procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with operating procedures
  - requirements for the use of operating manuals, system diagrams/plans and drawings
  - techniques - gas collection and analysis, bleeding and resetting, calibration, operational and sensitivity checks, and trip and alarm checks
  - surge relay types and uses, including transformer main tanks and diverter switch chambers
- commissioning procedures associated with discrete protection and control systems encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the commissioning procedures
  - requirements for the use of commissioning manuals, system diagrams/plans and drawings
  - techniques in commissioning procedures – planning, policy, testing techniques and close out requirements
- measurements and the interpretation and analysis of those measurements related to the plant and/or equipment type encompassing:
  - type of measurements - timing, current, voltage, capacitance, inductance, impedance, phase angle, phase shift, resistance, dielectric dissipation factor, frequency, polarisation index, ratio, vector group and temperature
  - interpretation and analysis the use of techniques - digital comparison of data, extrapolation, use of graphs and charts, statistics and tables, mathematical calculation of expected values and comparison with manufacturer data and measurements
  - techniques in the processes involved in follow-up actions and recommendations resulting from analysis and interpretation of results and measurements
- principles of power transformer construction and operations encompassing:
  - 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 (SVC) 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

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risks; types, selection, maintenance and use of PPE

- types and applications of test equipment encompassing:
  - standards, codes, Commonwealth/state/territory and local government legislation, supply authority regulations and/or enterprise requirements applicable to the use and application of electrical and/or electronic test equipment
  - types and applications of test equipment used on discrete protection scheme
  - techniques in the use of test equipment - electronic test equipment (Doble and Ohmnicrome), gas injection equipment, manufacturer test equipment, multimeters, phase angle meters and meggers
- detailed operation and setting of 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, current transformer 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
- detailed operation of interdependent protection systems encompassing:
  - overcurrent and earth leakage schemes, including inter-tripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic and shading coils
  - pilot wire and 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
  - busbar protection and circuit breaker failure protection
  - reclose systems - applications, single shot, multi-shot, blocking schemes and synchronisation checking
- detailed operation of 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 and bus overcurrent - principles, feeder protection, transformer protection, bias systems, harmonic restraint, current transformer connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, current transformer connections, special considerations and digital systems
  - types of revenue metering
  - applications of supervisory control and data acquisition (SCADA)
  - complex protection systems for communications
  - harmonic control
  - point on wave switching.

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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 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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UETTDRTS37 Perform current injection testing using phantom load

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 current injecting testing using a phantom load. It includes the application of artificial load onto low voltage (LV) current transformers to determine correct meter function while ensuring testing is conducted in accordance with established procedures.

It also includes the validation of secondary wiring circuits to determine the correct operation of the metering scheme.

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

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

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

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UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

Competency Field

Testing

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 for the performance of current injection testing using phantom load	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the performance of current injection testing using phantom load, are reviewed and determined
	1.2 Purpose of the performance of current injection testing using phantom load is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the performance of current injection testing using phantom load are obtained or established with appropriate personnel
	1.4 Performance of current injection testing using phantom load procedures are discussed with/directed to appropriate personnel in order to ascertain the project

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		brief
	1.5	Current injecting testing parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the performance of current injection testing using phantom load	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Decisions with regard to performance of current injection testing using phantom load are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Mathematical/engineering models for the application of current injection testing using phantom load are used to analyse the effectiveness of the finished project in accordance with requirements and established procedures
	2.4	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate

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		authorities consulted, where necessary, in accordance with requirements and established procedures
	2.5	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.6	Application of current injection testing using phantom load is undertaken according to requirements and established procedures
	2.7	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.8	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the performance of current injection testing using phantom load	**3.1**	Final inspections of the low voltage (LV) current transformers are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the application of current injection testing using phantom load documents are issued and records are updated 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

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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 UETTDRTS37A Perform current injection testing using phantom load.

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 UETTDRTS37 Perform current injection testing using phantom load

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 on at least three (3) occasions, the following:
  - application of artificial load onto low voltage (LV) current transformers for injection of current to determine correct meter function testing
- performing on at least three (3) occasions, the following:
  - validation of secondary wiring circuits to determine the correct operation of the metering scheme
- 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:

- the application of current to an existing customer load through the primary of the current transformer
- understanding the principles of current transformer operation
- determine the loading of the current transformer to apply the appropriate level of current required to verify the current transformer ratio, polarity and secondary wiring
- identifying any impacts of testing on market settlement/financial data and managing the data substitution 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

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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 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, 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

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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UETTDRTS38 Install and replace high voltage metering and associated 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 covers the installation and replacement of high voltage (HV) metering and associated equipment. Replacement includes the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with operating standards.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

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

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UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

Competency Field

Testing

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 for the installation and replacement of HV metering and associated equipment	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the installation and replacement of HV metering and associated equipment, are reviewed and determined
	1.2 Purpose of the installation and replacement of HV metering and associated equipment is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the installation and replacement of HV metering and associated equipment are obtained or

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		established with appropriate personnel
	1.4	Installation and replacement of HV metering and associated equipment procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Installation and replacement parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients, customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal and external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the installation and replacement of HV metering and associated equipment	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	Installation and replacement of HV metering and associated equipment decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance

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		with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Installation and replacement of HV metering and associated equipment is undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the installation and replacement of HV metering and associated equipment	**3.1**	Final inspections of the installation and replacement of HV metering and associated equipment are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of the installation and replacement of high voltage metering and associated equipment documents are issued and records are updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS38A Install and replace high voltage metering and associated 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 UETTDRTS38 Install and replace high voltage metering and associated 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
- performing installation and replacement, on at least three (3) occasions, of at least three (3) of the following:
  - high voltage (HV) metering schemes
  - HV zone substation metering schemes
  - HV bulk supply point metering schemes
  - HV summation metering schemes
- performing on at least three (3) occasions, the installation and replacement of the following:
  - HV current/voltage transformers (including return to service)
  - energy meters
  - associated equipment
- performing on at least one (1) occasion, the following activity:
  - installation or replacement of a typical HV bulk supply point metering scheme
- 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:

- associated equipment encompassing:
  - fuses, current transformers, voltage transformers, test block, current transformer chamber, marshalling kiosk, wiring, voltage fail relays, sealing equipment, terminals, links, modems, communications equipment, direct current (d.c.) supplies, aerials, optical isolation equipment, fibre optics, solid state recorders, pulse repeat relays, pulsing outputs, energy/distribution management systems, communication interface modules, and alarms

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- selection of suitable equipment to meet site requirements and other requirements as prescribed by the regulated energy market rules
- communicating as required with market participants, including meter data provider and responsible person
- meter storage, handling and disposal processes in accordance with enterprise policies and procedures
- awareness of jurisdictional rules and requirements to allow work to be performed in local network service provider areas
- standards, codes, Commonwealth/state/territory legislation, supply authority regulations and/or enterprise requirements associated with the installation and replacement of HV metering and associated equipment procedures
- use of enterprise and/or manufacturer manuals, system diagrams/plans and drawings and other related documentation for the installation and replacement of HV metering and associated equipment
- work in accordance with enterprise safe systems of 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 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, 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

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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UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

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 demonstrating and understanding of the regulated energy market national regulations to daily work practices of a customer's revenue metering installation.

It also includes demonstrating detailed knowledge of the individual's role and responsibilities as the onsite representative of the metering provider.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

Competency Field

Testing

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 for the maintaining of compliance with national electricity market metrology practices and procedures	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the maintaining of compliance with national electricity market metrology practices and procedures, are reviewed and determined
	1.2 Purpose of the maintaining of compliance with national electricity market metrology practices and procedures is established after data is analysed and expected outcomes

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		of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the maintaining compliance with national electricity market metrology practices and procedures are obtained or established with appropriate personnel
	1.4	Maintenance of compliance with national electricity market metrology practices and procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Maintenance of compliance with national electricity market metrology practices and procedures parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the maintaining of compliance with national electricity market metrology practices and procedures	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established

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		procedures
	2.3	Lifting, climbing, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine management of compliance issues with national electricity market metrology practices and procedures is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the maintaining of compliance with national electricity market metrology practices and procedures to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the maintaining of compliance with national electricity market metrology practices and procedures	**3.1**	Final compliance inspections with the maintenance of compliance with national electricity market metrology practices and procedures are undertaken to ensure they conform to all requirements and include all specifications and documents needed to complete the project

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3.2 Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the maintaining of compliance with national electricity market metrology practices and procedures, documents are issued and records are updated 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 UETTDRTS39A Maintain compliance with national electricity market metrology practices and procedures.

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 UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

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 on at least three (3) occasions, the following activity:
  - maintaining the compliance of a customer's revenue metering installation with the metrology practices and procedures of the national electricity market
- demonstrating, on least one (1) occasion, the following activity:
  - the ability to locate, interpret and apply national electricity market rules
- 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:

- navigation of the internet to ascertain current technical and procedural standards applicable to meter provision within the regulated energy market
- interpreting and applying current technical and procedural standards applicable to meter provision within the regulated energy market
- maintaining customer and metering documentation in accordance with enterprise and regulatory requirements applicable to meter service provision in the regulated energy market
- processes and procedures applicable
- identifying and managing risks to compliance
- duties and obligations of market participants
- timeframes applicable to metering
- legal obligations of market and non-market participants
- other relevant legislations, WHS/OHS and trade practices act
- exemption procedures and data substitution procedures

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- categories and types of metering installations
- accuracy class for types 1-7
- customer negotiations skills
- ISO 9001:2015 Quality Management System accreditation, ISO 14001:2015 Environmental Management System and 3860 OHS)
- auditing course
- service level requirements
- meter asset management plan
- penalties for non-compliance
- interrogating and interpreting meter register, type of site, installation date, overall accuracy and ratios.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRTS40 Test and maintain energy/revenue metering schemes

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 testing and maintenance of energy/revenue metering schemes. It includes testing, isolation, inspection, monitoring, adjustment, repair, refurbishment and/or overhaul and functional checks of energy/revenue metering schemes.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures, compliance to tariff requirements, revenue billing, energy registration and the identification of faults with metering equipment in accordance with established procedures.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

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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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

Competency Field

Testing

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 for the testing and maintenance of energy/revenue metering schemes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of energy/revenue metering

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		schemes, are reviewed and determined
	1.2	Purpose of testing and maintenance of energy/revenue metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the testing and maintenance of energy/revenue metering schemes are obtained or established with appropriate personnel
	1.4	Testing and maintenance of energy/revenue metering schemes procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Testing and maintenance parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing and maintenance of energy/revenue metering schemes	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or

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		established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine testing and acceptance testing of the installation, testing and maintenance of revenue metering schemes is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe testing and maintenance of energy/revenue metering schemes to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the testing and maintenance of energy/revenue metering	**3.1**	Final inspections of the testing and maintenance of energy/revenue metering schemes using routine tests and acceptance tests are undertaken to ensure they

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schemes		comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the testing and maintenance of energy/revenue metering schemes, documents are issued and records updated 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 UETTDRTS40A Test and maintain energy/revenue metering schemes.

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 UETTDRTS40 Test and maintain energy/revenue metering schemes

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 on at least three (3) occasions, testing/maintaining all of the following:
  - ensuring meter function
  - determining energy flows, voltage, current and phasor relationships
  - inspecting/monitoring equipment
  - gathering of information to ensure the application of standards and specifications have been met
  - specific notification of faults with metering equipment affecting energy registration and revenue billing in accordance with established procedures
  - ensuring that the installation is operating within prescribed limits (enterprise, manufacturer and regulated energy market requirements)
  - making recommendations, adjustments, replacements and repairs
- performing on at least three (3) occasions, all of the following:
  - isolating, at local fuses and links
  - determining actions against standards if additional isolation is required
- demonstrating on at least three (3) occasions, the functionality of the metering scheme in accordance with:
  - electrical installation (state and national) standards
  - metrology procedures
  - compliance to tariff requirements
- 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

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the requirements of the elements and performance criteria and include knowledge of:

- operation of energy metering test equipment
- test equipment encompassing:
  - voltmeters, amp meters, Ohm meters, kWh/kVarh standards, tong ammeters, phase rotation meter, power factor meters, power quality meters, phantom load devices, current/voltage injection devices, measurement bridges, insulation resistance tester, phase angle meters, multimeters, standard current transformers/voltage transformers and insulated operating sticks
- other equipment encompassing:
  - personal computer, calculator, stop watches, printers, telecommunication devices and global positioning systems (GPS)
- knowledge of test principles and theories
- techniques in the testing and maintenance procedures of energy metering schemes in accordance with Commonwealth/state/territory legislation, supply authority regulations and enterprise standards
- ensure compliance with ISO 9001:2015 Quality Management Systems
- evaluation of test results to ensure compliance with ISO and Australian Standards
- notification of non-compliance to relevant parties.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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
- relevant plant, drawings, manufacturer specifications/manuals and specialised testing equipment
- applicable documentation, including workplace procedures, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

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Links

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UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated 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 covers the installation and replacement of energy/revenue meters and associated equipment in complex situations. Replacement includes the identification of faults in accordance with established procedures and return to service. It includes the requirements to ascertain if normal functions of the meters and associated equipment are in accordance with operating standards.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

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UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

UETTDRTS40 Test and maintain energy/revenue metering schemes

Competency Field

Testing

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 for the installation and replacement of energy/revenue metering schemes and associated equipment (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the installation and replacement of energy/revenue metering schemes and associated equipment (complex),

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		are reviewed and determined
	1.2	Purpose of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the installation and replacement of energy/revenue metering schemes and associated equipment (complex) are obtained or established with appropriate personnel
	1.4	Installation and replacement of energy/revenue metering schemes and associated equipment (complex) procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Installation and replacement parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients, customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal and external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the installation and replacement of energy/revenue metering	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent accidents and minimise waste are incorporated into the project in

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schemes and associated equipment (complex)		accordance with requirements and/or established procedures
	2.2	Installation and replacement of energy/revenue metering schemes and associated equipment (complex) decisions are made on the basis of safety and effective outcomes according to requirements and/or established procedures
	2.3	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.6	Essential knowledge and associated skills are applied to analyse specific data and compare it with compliance specifications to ensure completion of the project within an agreed timeframe according to requirements
	2.7	Installation and replacement of energy/revenue metering schemes and associated equipment (complex) are undertaken according to requirements and established procedures
	2.8	Work teams/groups are arranged/coordinated/evaluated to ensure planned goals are met according to established procedures
	2.9	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.10	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the installation and replacement of energy/revenue metering schemes and associated equipment (complex)	**3.1**	Final inspections of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to

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relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of the installation and replacement of energy/revenue metering schemes and associated equipment (complex) documents are issued and records are updated 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 UETTDRTS41A Install and replace complex energy/revenue metering schemes and associated 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 UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated 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
- performing installation and replacement, on at least three (3) occasions, including at least three (3) of the following:
  - high voltage (HV) metering schemes
  - high voltage zone substation metering schemes
  - high voltage bulk supply point metering schemes
  - low voltage (LV)summation metering schemes
- performing on at least three (3) occasions, the installation and replacement of the following:
  - HV current/voltage transformers (including return to service)
  - energy meters
  - associated equipment
- performing on at least one (1) occasion, the following activity:
  - installation or replacement of a typical HV bulk supply point metering scheme
- 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:

- associated equipment encompassing:
  - summation current transformers, voltage selection relays, auxiliary supply relays, voltage fail relays, fibre optics, data concentrators and in house displays
- the installation and replacement of complex energy/revenue metering schemes and associated equipment in accordance with enterprise policies and procedures applicable to the work -

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impact of work on local network system integrity, substation entry and access requirements, and impacts of isolation on protection and 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 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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UETTDRTS42 Management of energy registration data errors for revenue billing purposes

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 management of energy registration data errors for revenue billing purposes. It covers the identification of energy registration error within a metering scheme, evaluating the impact on the energy registration and customer billing data, and making recommendation for billing corrections and market settlement data updates.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

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

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UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

UETTDRTS40 Test and maintain energy/revenue metering schemes

Competency Field

Testing

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 for the management of energy registration data errors for revenue billing purposes	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of energy registration data errors for revenue billing purposes, are reviewed and determined
	1.2 Purpose of the management of energy registration data

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		errors for revenue billing purposes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the management of energy registration data errors for revenue billing purposes are obtained or established with appropriate personnel
	1.4	Management of energy registration data errors for revenue billing purposes are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Management of energy registration data errors for revenue billing purposes are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of energy registration data errors for revenue billing purposes	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures

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	2.2 First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3 Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4 Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5 Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6 Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7 Evaluation of revenue metering data and faults is carried out in accordance with the work schedule
	2.8 Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9 Essential knowledge and associated skills are applied in the management of energy registration data errors for revenue billing purposes to ensure completion in an agreed timeframe according to requirements
	2.10 Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11 Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the evaluation of revenue metering data and faults	**3.1** Final inspections of the management of energy registration data errors for revenue billing purposes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project

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3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the management of energy registration data errors for revenue billing purposes, documents are issued and records updated 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 UETTDRTS42A Management of energy registration data errors for revenue billing purposes.

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 UETTDRTS42 Management of energy registration data errors for revenue billing purposes

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 on at least three (3) occasions, the evaluation of two (2) revenue metering data by:
  - downloading load profile data
  - downloading event logs
  - determining error date and time (including calculating substitution data)
- demonstrating on at least three (3) occasions, the use of at least two (2) different proprietary types of software to interpret the following:
  - alarms
  - meter program/software settings
  - event records
  - power quality records
  - sequence of events records
- performing on at least three (3) occasions, the following:
  - report writing on in-depth analysis
- performing on at least three (3) occasions, the evaluation and/or investigation of the following:
  - energy consumption data
  - registration data
  - current transformer/voltage transformer ratio confirmations
  - on-site load comparisons
  - customer consumption history
- performing on at least two (2) occasions, the following:
  - consultation with customers or their representatives to confirm site consumption patterns and loading

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- 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:

- the use of different types of meter manufacturer proprietary software
- common failure modes and the impact on revenue billing
- tariff structures and conditions
- customer segments and commercial and industrial load patterns
- sources of alternative interval data from non-revenue metering systems for use in substitution of revenue data
- metering data substitution estimation and validation procedures for metering types 1-7.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRTS43 Commission energy/revenue metering schemes

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 commissioning of energy/revenue metering schemes. This includes isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and/or overhaul and functional checks of revenue metering schemes. It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

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

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UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

UETTDRTS40 Test and maintain energy/revenue metering schemes

UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated equipment

UETTDRTS42 Management of energy registration data errors for revenue billing purposes

Competency Field

Testing

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 for the commissioning of energy/revenue metering	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence

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schemes		the commissioning of energy/revenue metering schemes, are reviewed and determined
	1.2	Purpose of the commissioning of energy/revenue metering schemes is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3	Organisational established procedures, policies and specifications for the commissioning of energy/revenue metering schemes are obtained or established with appropriate personnel
	1.4	Commissioning of energy/revenue metering schemes procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5	Commissioning parameters are established from organisational established procedures, policies and specifications
	1.6	Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7	Work roles and tasks are allocated according to requirements and individual competencies
	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of energy/revenue metering schemes	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or

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		established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Commissioning of energy/revenue metering schemes is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe commissioning of revenue metering schemes to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the commissioning of energy/revenue metering schemes	**3.1**	Final inspections of the commissioning of energy/revenue metering schemes using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the

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project

3.2 Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes

3.3 Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval

3.4 Approved copies of routine testing and acceptance testing procedures/activities/results, for the commissioning of energy/revenue metering schemes, documents are issued and records updated 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 UETTDRTS43A Commission energy/revenue metering schemes.

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 UETTDRTS43 Commission energy/revenue metering schemes

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 on at least three (3) occasions, the commissioning of the following metering schemes types:
  - single feeder high voltage (HV)
  - low voltage (LV) current transformer customer sites
- performing on at least three (3) occasions, commissioning involving at least seven (7) of the following:
  - isolation
  - inspection
  - monitoring
  - testing
  - adjustment
  - repair
  - refurbishment and/or overhaul
  - functional checks of revenue metering schemes
- demonstrating on at least three (3) occasions, knowledge and application of at least two (2) different manufacturers:
  - proprietary software
  - application programming
  - interrogations
- undertaking, on at least three (3) occasions, the following:
  - calculations, including obtain final revenue multiplier
  - validation of meter pulse multiplier
- 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:

- commissioning techniques
- evaluation of the metering design and equipment accuracy to ensure suitability with national electricity market requirements
- recording nameplate details for all metering scheme components and ensuring compliance with the design accuracy class
- confirmation of instrument transformer connected ratios, polarities, burdens and voltage drops
- checking integrity of all wiring, connections and terminalisation's
- ensuring cable types and sizes selected are correct
- phase sequence and vector relationships are correct
- documentation verifying the errors of current transformers and voltage transformers
- validation of meter data to verify the metering programming parameters, display and error functions are all correct in accordance with manufacturer specifications
- verifying meter programming to ensure the best possible resolution of energy data measurement and recording
- validating the interval data with the responsible person and/or meter data provider
- confirming remote communications with the metering is established and is of sufficient quality to support reliable communications and data transfer
- standards, codes, Commonwealth/state/territory legislation, supply authority regulations and-or enterprise requirements associated with the commissioning procedures
- requirements for the use of isolation and tagging, manuals, system diagrams/plans and drawings
- requirements for the use of maintenance and commissioning manuals, system diagrams/plans and drawings
- techniques in commissioning procedures – planning, policy and testing techniques
- close out requirements
- requirements for the use of meter manufacturer manuals, system diagrams/plans and drawings.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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.

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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
- 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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UETTDRTS44 Test and maintain energy/revenue metering schemes (complex)

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 testing and maintenance of energy/revenue metering schemes in complex situations. Complex metering schemes include summation, subtraction, generation, bulk supply, interconnector and wholesale metering installations. Testing and maintenance include isolation, accuracy testing, inspection, monitoring, adjustment, repair or overhaul and functional checks of complex energy/revenue metering schemes.

It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

This also includes the identification of faults with metering equipment, energy registration and revenue billing in accordance with established procedures.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

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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

UEENEEG076A Install and replace low voltage current transformer metering

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

UETTDRTS40 Test and maintain energy/revenue metering schemes

UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated equipment

UETTDRTS42 Management of energy registration data errors for revenue billing purposes

UETTDRTS43 Commission energy/revenue metering schemes

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Competency Field

Testing

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 for the testing and maintenance of energy/revenue metering schemes (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the testing and maintenance of energy/revenue metering schemes (complex), are reviewed and determined
	1.2 Purpose of testing and maintenance of energy/revenue metering schemes (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the testing and maintenance of energy/revenue metering schemes (complex) are obtained or established with appropriate personnel
	1.4 Testing and maintenance of energy/revenue metering schemes (complex) procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Testing and maintenance parameters are established from organisational established procedures, policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies

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	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the testing and maintenance of energy/revenue metering schemes (complex)	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine testing and acceptance testing of the testing and maintenance of energy/revenue metering schemes (complex) are carried out in accordance with the work schedule

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	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe testing and maintenance of energy/revenue metering schemes (complex) to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the testing and maintenance of energy/revenue metering schemes (complex)	**3.1**	Final inspections of the testing and maintenance of energy/revenue metering schemes (complex) using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the testing and maintenance of energy/revenue metering schemes (complex), documents are issued and records updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS44A Test and maintain energy/revenue metering schemes (complex).

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 UETTDRTS44 Test and maintain energy/revenue metering schemes (complex)

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 on at least three (3) occasion, the following activity:
  - field injection testing which includes determining site accuracy by applying multiple specific test points to determine and correct meter accuracy to applicable standards
- performing on at least three (3) occasions, the testing and maintenance of any four (4) of the following:
  - summation
  - subtraction
  - generation
  - bulk supply
  - interconnector
  - wholesale metering installations
- performing on at least three (3) occasions, the following activities:
  - identification of faults with metering equipment, energy registration and revenue billing
  - ensuring that all connection points are in operational order
  - identifying and correcting y functional errors
- dealing with unplanned events on at least (1) one 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:

- determining from schematics whether additional isolation is required and ensuring any current/voltage injection does not impact on related protection, control and supervisory control and data acquisition (SCADA) schemes

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- calculation of site overall offset errors due to applied correction factors to the scheme
- calculation of site overall errors for logical metering schemes based on test results of individual related physical metering points
- identifying any impacts of testing on market settlement/financial data and managing the data substitution requirements
- determining the requirement for temporary metering during testing to ensure market settlement data is not adversely affected
- modifying and adapting test procedures to test non-standard metering schemes
- determining impacts of testing to ensure customer control, process and energy management systems are not adversely effected.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRTS45 Manage compliance with national electricity market metrology practices and procedures

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 management of compliance with national electricity market metrology practice and procedures. It includes managing work functions to ensure the compliance of a customer's revenue metering installation. This includes demonstrating detailed knowledge of the role and responsibilities as the representative of the metering provider. It also includes the establishment/maintenance of relationships with other market participants, and management of compliance with organisational policies, procedures and the national electricity market.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

UETTDRTS40 Test and maintain energy/revenue metering schemes

UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated equipment

UETTDRTS42 Management of energy registration data errors for revenue billing purposes

UETTDRTS43 Commission energy/revenue metering schemes

Competency Field

Testing

Unit Sector

Not applicable.

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 Plan for the management of compliance with national electricity market metrology practices and procedures	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the management of compliance with national electricity market metrology practices and procedures, are reviewed and determined
	1.2 Purpose of the management of compliance with national electricity market metrology practices and procedures is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the management of compliance with national electricity market metrology practices and procedures are obtained or established with appropriate personnel
	1.4 Management of compliance with national electricity market metrology practices and procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Management of compliance with national electricity market metrology practices and procedures parameters are established from organisational established procedures, policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule

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	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the management of compliance with national electricity market metrology practices and procedures	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to the immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Routine management of compliance issue with national electricity market metrology practices and procedures is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the management of compliance with national electricity market metrology practices and procedures to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and

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		actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the management of compliance with national electricity market metrology practices and procedures	**3.1**	Final compliance inspections with management of compliance with national electricity market metrology practices and procedures are undertaken to ensure they conform to all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the management of compliance with national electricity market metrology practices and procedures, documents are issued and records updated 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 UETTDRTS45A Manage compliance with national electricity market metrology practices and procedures.

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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 UETTDRTS45 Manage compliance with national electricity market metrology practices and procedures

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 on at least one (1) occasion, at least one (1) of the following activities:
  - ensuring compliance to the meter assets management plan
  - conducting appropriate field audits on behalf of or with a representative of the regulated energy market
- performing on at least one (1) occasion, the following activity:
  - coordinating job activities for multiple discipline work groups
- performing on at least one (1) occasion, the following activity:
  - managing work functions to ensure the compliance of a customer’s revenue metering installation
- performing on at least two (2) occasions, the following activity:
  - establishing/maintaining relationships with other market participants
- performing on at least three (3) occasions, the following activity:
  - managing compliance with organisational policies, procedures and the national electricity market requirements
- 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:

- standards, codes, rules and regulations applicable to operation within a regulated energy market
- roles and responsibilities of a market participant (meter data provider, meter provider or

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responsible person) operating within a regulated energy market
- detailed knowledge and understanding of the composition of a meter asset management pan (MAMP)
- the provisions of the organisations meter asset management plan
- coordinating job activities for multiple discipline work groups
- auditing for compliance within the regulated energy market
- ISO accreditation applicable to operation within a regulated energy market
- compliance with the organisations service level requirements within the regulated energy market
- management of customer, client and regulator negotiations and correspondence within a regulated energy market
- maintaining meter data within a regulated energy market
- managing registration of customer metering installations within the regulated energy market.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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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UETTDRTS46 Verification and certification of revenue metering/energy measurement instruments

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 evaluation and development of procedures and routines to certify the accuracy, traceability and uncertainty of measurement of metering standards and test equipment. This encompasses developing test procedures, PC controlled and software driven test sequences and includes the evaluation of test equipment capability and design of hardware interfaces. These processes must ensure compliance with metering industry regulations to ensure traceability of all measurement.

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

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

UEENEEG076A Install and replace low voltage current transformer metering

UEENEEG101A Solve problems in electromagnetic devices and related circuits

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UEENEEG102A Solve problems in low voltage a.c. circuits

UEENEEG103A Install low voltage wiring and accessories

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

UETTDRTS40 Test and maintain energy/revenue metering schemes

UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated equipment

UETTDRTS42 Management of energy registration data errors for revenue billing purposes

UETTDRTS43 Commission energy/revenue metering schemes

Competency Field

Testing

Unit Sector

Not applicable.

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 Plan for the verification and certification of revenue metering/energy measurement instruments	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence verification and certification of revenue metering/energy measurement instruments, are reviewed and determined
	1.2 Purpose of the verification and certification of revenue metering/energy measurement instruments is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the verification and certification of revenue metering/energy measurement instruments are obtained or established with appropriate personnel
	1.4 Verification and certification of revenue metering/energy measurement instruments procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Verification and certification parameters are established from organisational established procedures policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies
	1.8 Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11 Relevant internal/external work permits are obtained to coordinate the performance of work according to

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		requirements and/or established procedures
2 Carry out the verification and certification of revenue metering/energy measurement instruments	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Verification and certification of revenue metering/energy measurement instruments is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards, safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe verification and certification of revenue metering/energy measurement instruments to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements

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	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the verification and certification of revenue metering/energy measurement instruments	**3.1**	Final inspections of the verification and certification of revenue metering/energy measurement instruments using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the verification and certification of revenue metering/energy measurement instruments, documents are issued and records updated 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 UETTDRTS46A Verification and certification of revenue metering/energy measurement instruments.

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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 UETTDRTS46 Verification and certification of revenue metering/energy measurement instruments

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 on at least three (3) occasions, the following activity:
  - developing and evaluating procedures and routines to verify and certify the accuracy, traceability and uncertainty of metering standards and test equipment
- performing on at least one (1) occasion, the following activity:
  - evaluating and implementing procedures and practices to ensure traceability of test equipment to National Association of Testing Authorities (NATA) requirements
- performing on at least one (1) occasion, the following activity:
  - developing test procedures for new hardware and analysing performance against required outcomes
- performing on at least one (1) occasion, the following activity:
  - evaluating test equipment capability and design of hardware interfaces
- 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:

- enterprise-specific policies and procedure instructions encompassing:
  - 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

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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
- electrical field testing and measurement encompassing:
    - measurement concepts - notion of error, accuracy, 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 - instrument meter movements and readouts (moving coil, moving iron and dynamometer meter movements, liquid crystal display (LCD) digital and screen readouts), and role of a microprocessor/controller in measuring instrument
    - measuring low voltages (LV) and direct current (d.c.) and alternating currents (a.c.) - LV and current measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings
    - measuring HV and d.c. and a.c. - HV and current measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings
    - measuring fault levels and (earth) fault loop impedance - 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, and interpreting test readings
    - measuring power, energy, reactive power, power factor and maximum demand - power measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings
    - measuring power quality - power measurement techniques embodied in microprocessor based instruments, causes of inaccuracies and overcoming them, test instrument set-up and safety procedures, and interpreting test readings (power quality measurement, including waveform distortion, harmonics, power factor and transients)
- calibration techniques encompassing:
    - principles of common calibration techniques
    - purpose of standards and calibration certification
    - minimising error during calibration - source and type of errors, techniques to minimise errors during measurements, calculating the degree of error and calibration factors
    - determining the parameters to which the device will be calibrated
    - need for normal performance check
    - purpose of calibration documentation.

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
- 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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UETTDRTS47 Commission energy/revenue metering schemes (complex)

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 commissioning of energy/revenue metering schemes in complex situations, including summation, subtraction, generation, bulk supply, interconnector and wholesale metering installations. This includes isolation, inspection, monitoring, testing, adjustment, repair, refurbishment and/or overhaul and functional checks of complex revenue metering schemes. It includes the requirements to prove the functionality of the metering scheme in accordance with electrical installation (state and national) standards, metrology procedures and compliance to tariff requirements.

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

UEENEED104A Use engineering applications software on personal computers

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

UEENEEE124A Compile and produce an energy sector detailed report

UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

UEENEEE126A Provide solutions to basic engineering computational problems

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

UEENEEG006A Solve problems in single and three phase low voltage machines

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UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

UEENEEG063A Arrange circuits, control and protection for general electrical installations

UEENEEG076A Install and replace low voltage current transformer metering

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

UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

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

UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

UEENEEG171A Install, set up and commission interval metering

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL15 Respond to power systems technical enquiries and requests

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

UETTDRTS37 Perform current injection testing using phantom load

UETTDRTS38 Install and replace high voltage metering and associated equipment

UETTDRTS39 Maintain compliance with national electricity market metrology practices and procedures

UETTDRTS40 Test and maintain energy/revenue metering schemes

UETTDRTS41 Install and replace complex energy/revenue metering schemes and associated equipment

UETTDRTS42 Management of energy registration data errors for revenue billing purposes

UETTDRTS43 Commission energy/revenue metering schemes

UETTDRTS44 Test and maintain energy/revenue metering schemes (complex)

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Competency Field

Testing

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 for the commissioning of energy/revenue metering schemes (complex)	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) practices/procedures and environmental and sustainable energy procedures, which may influence the commissioning of energy/revenue metering schemes (complex), are reviewed and determined
	1.2 Purpose of the commissioning of energy/revenue metering schemes (complex) is established after data is analysed and expected outcomes of the work are confirmed with appropriate personnel
	1.3 Organisational established procedures, policies and specifications for the commissioning of energy/revenue metering schemes (complex) are obtained or established with appropriate personnel
	1.4 Commissioning of energy/revenue metering schemes (complex) procedures are discussed with/directed to appropriate personnel in order to ascertain the project brief
	1.5 Commissioning parameters are established from organisational established procedures, policies and specifications
	1.6 Equipment/tools and personal protective equipment (PPE) are selected based on specified performance criteria and established procedures
	1.7 Work roles and tasks are allocated according to requirements and individual competencies

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	1.8	Work is prioritised and sequenced for the most efficient/effective outcome, completed within an acceptable timeframe, to a quality standard and in accordance with established procedures
	1.9	Liaison and communication issues with others/authorised personnel, authorities, clients and customers are resolved and activities coordinated to carry out work
	1.10	Risk control measures are identified, prioritised and evaluated against the work schedule
	1.11	Relevant internal/external work permits are obtained to coordinate the performance of work according to requirements and/or established procedures
2 Carry out the commissioning of energy/revenue metering schemes (complex)	**2.1**	WHS/OHS and sustainable energy principles, functionality and practices to prevent the incidents of accidents and minimise waste are incorporated into the project in accordance with requirements and/or established procedures
	2.2	First aid, rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised personnel for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Testing equipment is used in accordance with the work schedule and requirements and/or established procedures
	2.7	Commissioning of energy/revenue metering schemes (complex) is carried out in accordance with the work schedule
	2.8	Technical advice is given regarding potential hazards,

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		safety risks and control measures so that monitoring and preventative action can be undertaken and/or appropriate authorities consulted, where necessary, in accordance with requirements and established procedures
	2.9	Essential knowledge and associated skills are applied in the safe commissioning of energy/revenue metering schemes (complex) to ensure completion in an agreed timeframe according to requirements
	2.10	Solutions to non-routine problems are identified and actioned, using essential knowledge and associated skills, according to requirements
	2.11	Quality of work is monitored against personal performance agreement and/or established organisational and professional standards
3 Complete the commissioning of energy/revenue metering schemes (complex)	**3.1**	Final inspections of the commissioning of energy/revenue metering schemes (complex) using routine tests and acceptance tests are undertaken to ensure they comply with all requirements and include all specifications and documents needed to complete the project
	3.2	Appropriate internal/external personnel are notified of completion and reports and/or completion documents are finalised/commissioned according to established procedures and timeframes
	3.3	Reports and/or completion documents are submitted to relevant personnel/organisations for approval and, where applicable, statutory or regulatory approval
	3.4	Approved copies of routine testing and acceptance testing procedures/activities/results, for the commissioning of energy/revenue metering schemes (complex), documents are issued and records updated in accordance with established 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRTS47A Commission energy/revenue metering schemes (complex).

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 UETTDRTS47 Commission energy/revenue metering schemes (complex)

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 on at least three (3) occasions, the commissioning of at least seven (7) of the following complex metering scheme types:
  - multiple feeder high voltage (HV) and low voltage (LV) customers
  - summation
  - subtraction
  - interposing
  - voltage changeover schemes
  - generation
  - zone substation
  - bulk supply
  - interconnector
  - wholesale metering
- performing on at least three (3) occasions, at least six (6) of the following activities:
  - isolation
  - inspection
  - monitoring
  - testing
  - adjustment
  - repair
  - refurbishment and/or overhaul
  - functional checks of complex revenue metering schemes
- performing on at least three (3) occasions, all the following activities:
  - ensuring meter function using multiple proprietary software applications
  - determining energy flows, voltage, current and phasor relationships

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  - validating against independent information sources and test results to ensure that the installation is operating within prescribed limits (enterprise, manufacturer, and regulated energy market requirements)
  - validation of the actual meter energy data against meter data provider remote data streams
  - calculating and recording the overall installation site
  - ensuring compliance with regulated energy market compliance
  - endorsing the site overall accuracy and installation compliance as the technical representative authorised by the metering provider
  - ensuring all records of the commissioning of energy/revenue metering schemes (complex) are complete and forwarded to the appropriate authority in accordance with regulatory requirements
- 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:

- additional hardware components which add complexity and the possibility for greater uncertainty in overall accuracy
- calculations are more complex and require consideration of multiple sources of errors to accurately determine the overall site errors
- calculation and verification of correct application of transformer losses, transmission line losses and correction factors in meter programming
- determining the inputs and relationships required of physical metering points to establish and verify logical metering schemes
- consideration to all sources of burden on the metering instrument transformers and ensuring the instrument transformer is operating within its accuracy limits
- communicating with market participants, including meter data provider and responsible person
- knowledge of high fault currents
- risk assessments and safe systems of 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 conditions involving realistic and authentic activities that replicate operational 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
- 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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UETTDRVC21 Use climbing techniques to cut vegetation above ground near live electrical 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 cutting and/or pruning vegetation above ground level (using climbing techniques) and removal of vegetation obstructions up to the climber exclusion zone as defined for both authorised and instructed persons in the industry guidelines associated with live electrical apparatus, using the established cutting plan relevant to the vegetation type. It encompasses the safe use of appropriate specialised tools and equipment according to requirements and established procedures. It includes the utilisation of climbing techniques in conjunction with aerial emergency rescue procedures, and inspection and preparation of climbing equipment with recommendations for corrective action being referred to appropriate authorities.

It includes safely accessing trees from above ground level to install restraints/slings, removing tree limbs in a safe manner, and clearing debris from the felling site to eliminate the occurrence of electrical incidents. It does not include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones are in compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning and removal of vegetation around live powerlines up to the live work zone, including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

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UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

UETTDRVC33 Apply pruning techniques to vegetation control near live electrical apparatus

UETTDRVC34 Undertake release and rescue from a tree near live electrical apparatus

Competency Field

Vegetation

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 cut/prune vegetation above ground (using climbing technique) up to the vegetation exclusion zone near live electrical apparatus	**1.1** Work instructions and cutting plan are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed in accord with the cutting are discussed with all personnel to establish and confirm the work schedule
	1.3 WHS/OHS policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist and/or improve meeting the cutting of vegetation above ground level outside the climber exclusion zone near electrical apparatus outcomes are made to others involved in the work
	1.5 Hazards are identified and WHS/OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures

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	1.6	Scope of responsibility under the relevant work permits/access authorisations are identified according to requirements and established procedures with relevant personnel
	1.7	Resources, including, equipment, tools, approved platforms and personal protective equipment (PPE), required for the job are obtained and confirmed safe and in working order according to established procedures
	1.8	Relevant responsibilities associated with first aid, working aloft, and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9	Client issues, including environmental values, are identified and referred to appropriate personnel in accordance with industry//community standards
	1.10	Site is prepared to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures
	1.11	Road signs, barriers and warning devices are obtained and positioned in accordance with given instructions and requirements
	1.12	Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus according to requirements and established procedures
	1.13	Work permits/access authorisations are confirmed and received, where applicable, with relevant personnel for commencement of the work according to requirements and established procedures
2 Carry out the cutting/pruning of vegetation above ground (using climbing technique) up to the vegetation exclusion zone near live electrical apparatus	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures

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	2.2	Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements to eliminate the prospects of incidents
	2.3	Operational knowledge for the cutting of vegetation above ground level outside the climber exclusion zone near electrical apparatus is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	Cutting of vegetation above ground level outside the climber exclusion zone near electrical apparatus is carried out in accordance with the cutting plan and work schedule and given instructions and established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks monitored and reported/referred to immediate authorised personnel for directions according to established procedures
	2.6	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.7	Problems associated with cutting vegetation above ground level outside of the vegetation exclusion zone near electrical apparatus are attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
	2.8	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete the cutting/pruning of vegetation above ground (using climbing technique) up to the vegetation exclusion zone near live electrical apparatus	**3.1**	Work undertaken is checked against cutting plan and work schedule and anomalies reported to authorised personnel in accordance with established procedures
	3.2	Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established

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procedures

3.3 Worksite is rehabilitated, cleaned up and made safe using sustainable energy principles and practices in accordance with given instructions and established procedures or an agreed standard

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Appropriate personnel are notified of work completion according to established procedures

3.6 Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools/platform are conducted according to requirements

3.7 Requirements for returning work permits and/or access authorisation permits are confirmed, where applicable

3.8 Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDRVC21A Use climbing techniques to cut vegetation above ground near live electrical apparatus.

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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 UETTDRVC21 Use climbing techniques to cut vegetation above ground near live electrical 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
- confirming operational knowledge associated with the cutting vegetation above ground outside live work zone near live electrical apparatus in all of the following:
  - principles of electricity and three phase power system
  - power system
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe working zone and ordinary person zone so defined by relevant authorities
  - use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner’s procedures
  - system control - information required and function
  - vicinity permit - Information required and function
  - sensitive earth fault system
  - environmental principals and procedures
- confirming safe practices associated with the cutting vegetation above ground outside live work zone near live electrical apparatus in all of the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - release and rescue
  - role of the safety observer
  - events constituting an incident
  - procedures in the event of/responding to incidents
  - methods of identifying hazards

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  - risk assessment procedures for both worksite and pre-job checklist
  - selection of the best position for monitoring and controlling work (cutting)
  - selection of correct line of site to the cutter
  - correct observation of the work from ground level
  - constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and ongoing weather conditions
- confirming vegetation control associated with the cutting vegetation above ground outside live work zone near live electrical apparatus in all of the following:
  - identifying tree types
  - confirming vegetation species and types
  - confirming vegetation cutting techniques for different vegetation
  - confirming appropriate vegetation machinery and equipment to be used
  - using feeder route plans
- confirming the safe cutting of vegetation above ground outside live work zone near live electrical apparatus in all of the following:
  - using cutting plans relevant to the vegetation type
  - safely using all relevant personnel protective equipment (PPE)
  - using safe rigging and climbing procedures and techniques
  - safely operating restraints, slings, lifting and loads
  - safely using tools and equipment, such as hand saws, chainsaws, specialised tools and equipment and/or power pruners above ground
  - safely using chemical control and application above ground
  - using safe cutting, pruning and tree trimming techniques above ground near electrical apparatus
  - conducting pre and post-operational checks, inspection and minor maintenance
  - safely deploying equipment and tools in varying ground conditions and weather
  - safely removing debris
- 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:

- climbing techniques encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to climbing for the purpose of vegetation control
  - vegetation that is and is not permissible to climb for vegetation control
  - safety precautions which are specific to tree climbing structures for the control of vegetation - safe working practices and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of PPE, including harnesses; dangers of climbing

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in confined spaces and at heights; permit to work systems and isolation procedures/protocols; safe working policies, procedures and practices when climbing; and emergency response and rescue, including first aid
    - techniques in safe methods of controlling the descent of vegetation in an electrical environment - safety procedures, including safety ropes and lines; checking and setting up equipment; load calculations/estimations; techniques in using lowering equipment; and determining the serviceability of ropes and other lowering devices
    - load charts and safe working load estimates - field formulas; branch and trunk calculations; mathematical calculations; and use of technology related to loads, slings, weights and height
    - tree climbing and pruning practices - safe climbing with ropes and harnesses; methods of ensuring operation of safety lines and ropes, roping techniques, load bearing equipment and lifts; purposes of restraints, straps, slings, bends and hitches; purposes of pulleys, maillon rapides, lowering drum and T-bar flying capstan; and techniques in climbing with spikes and pole belts
    - role of safety observer and delimination of fall and drown zones
- enterprise-specific vegetation control equipment encompassing:
    - types and application of vegetation cutting tools – chainsaws, tool line, and specialised pruning tools (cocky beaks and pruning saws)
    - purpose and use of cutting plans relevant to the vegetation type
    - cutting techniques of vegetation control tools and equipment
    - techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf bottom-back cut technique, and side scarf opposite back-cut technique
    - pre-operational checks on vegetation control tools and equipment
    - techniques in safely using vegetation control equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, and precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, and possible fire danger due to sparks)
    - types of PPE used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection and general protection
    - basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement, and testing for compliance to manufacturer and WHS/OHS 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 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:

- 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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UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical 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 the preparation for the controlled removal of vegetation near live electrical apparatus up to the live work zone as defined for both authorised and instructed persons in the industry guidelines associated with live electrical apparatus. This includes electrical and communications conductors and cables/powerlines and associated equipment on poles and structures according to requirements and established procedures. It does not include the full gamut of rigging techniques and practices required of a rigger or entry into to the safe approach distance (SAD) as defined for persons, mobile plant, equipment and specialised tools.

It includes the preparation of a plan for the control and removal of vegetation, specification of appropriate chemical control methods, use of slinging and loading techniques and practices to be used, traffic management, and appropriate pruning and/or cutting techniques and practices (encompasses cutting plan) for given vegetation species to minimise regrowth within the electrical field according to requirements and procedures. Also included is the preparation of risk assessment control measures that encompass job safety assessment. Encompassed is compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone, including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

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Competency Field

Vegetation

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 the development of the plan for the removal of vegetation up to vegetation exclusion zone near electrical apparatus	**1.1** Work instructions are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the development of the work plan are discussed with all personnel to establish and confirm the work schedule
	1.3 WHS/OHS policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist in meeting the planning for the removal of vegetation up to the live work zone near live electrical apparatus outcomes are made to others involved in the work
	1.5 Hazards are identified and WHS/OHS risks are identified and reported according to established procedures
	1.6 Scope of responsibility under the relevant work permits/access authorisations are identified and confirmed according to requirements and established procedures with relevant personnel
	1.7 Resources, including, plant, equipment, tools and personal protective equipment (PPE) required for the job are identified in accordance with established procedures

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	1.8	Relevant responsibility associated with first aid, aerial rescue, tree-top rescue and/or other related work safety procedures at the worksite are confirmed, where appropriate, in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9	Client issues are identified and referred to appropriate personnel in accordance with industry/community standards
	1.10	Site preparation requirements are confirmed according to given instructions and planning of the work schedule for a quality outcome and to meet sustainable energy principles and practices to minimise risk and damage to property, commerce, stock and individuals in accordance and established procedures
	1.11	Road signs, barriers and warning device requirements are positioned in accordance with given instructions and requirements are confirmed
2 Carry out the development of the Plan for the removal of vegetation up to vegetation exclusion zone near live electrical apparatus	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are confirmed in accordance with given instructions, requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are confirmed in accordance with given instructions and according to requirements to eliminate the prospects of incidents
	2.3	Operational knowledge for planning the removal of vegetation up to the live work zone near live electrical apparatus to be applied to the work is confirmed to ensure completion will be within an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	Plan for the removal of vegetation up to the live work zone near live electrical apparatus is produced in accordance with given instructions and established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are monitored

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		and reported/referred to immediate authorised personnel for directions according to established procedures
	2.6	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.7	Development of the plan is carried out in accordance with the work schedule and to requirements
	2.8	Problems associated with producing the plan for the removal of vegetation up to the live work zone live electrical apparatus are attended to according to acquired known solutions and skills related to routine procedures to ensure the plan is produced in accordance with instructions and established procedures
	2.9	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete development of the plan for the removal of vegetation up to vegetation exclusion zone near electrical apparatus	**3.1**	Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures
	3.2	Potential accidents and/or incidents are identified and reported to authorised personnel in accordance with established procedures
	3.3	Worksite is rehabilitated, cleaned up and made safe in accordance with given instructions and established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Appropriate personnel are notified of work completion according to established procedures
	3.6	Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC23A Plan the removal of vegetation up to vegetation exclusion zone near live electrical 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 UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical 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
- confirming operational knowledge associated with the planning of the removal of vegetation in all of the following:
  - principles of electricity and the three-phase power system
  - power system
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe working zone so defined by relevant authorities
  - use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner’s procedures
  - confirm environmental principals and procedures
- confirming safe practices associated with the planning of the removal of vegetation in all of the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - release and rescue
  - role of the safety observer
  - events constituting an incident
  - procedures in the event of/responding to incidents
  - hierarchy and methods of identifying and controlling hazards
  - risk assessment procedures
  - selection of the best position for monitoring and controlling work (cutting)
  - selection of correct line of site to the cutter

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  - correct observation of the work from ground level
  - constant analysis and decision making relevant to the safety of the work, taking into account prevailing site conditions (lay of the land) and ongoing weather conditions
- confirming vegetation control associated with the planning of the removal of vegetation in all of the following:
  - identifying tree types
  - confirming vegetation species and types
  - confirming vegetation cutting techniques for different vegetation
  - confirming appropriate vegetation machinery and equipment to be used
  - using feeder route plans
  - conducting calculations related to loading and slinging
- 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:

- hazard assessment and risk management appropriate to the level of responsibility in the vegetation control field encompassing:
  - identifying the terminologies associated with risk assessment - risk management; risk analysis and risk evaluation activities and eliminating or minimising risk; principles and purposes of risk management; processes for conducting risk assessment, including risk analysis and risk evaluation activities for selecting and implementing appropriate options for eliminating or minimising risk
  - relationship risk assessment has with vegetation control
  - basic principles of hazard and risk assessment - what to look for, basic procedures in conducting worksite hazards/risk assessment, contingences, essential components of hazard assessment checks, and identification of hazards associated with work function and the environment (type of equipment to be used, location of the worksite, condition of the surrounding vegetation and climate conditions)
  - techniques in the elimination or minimisation of hazards/risks - identification of resources available, identification of appropriate methodology in hazard control, identification of the hierarchy of control, and formulating a worksite hazard and risk assessment checklist
  - pre-job hazard assessment check items - job safety analysis (JSA), planned inspection, hazard risk assessment form and prompt sheet reference (Vegetation Management Plan (VMP) 2 - electrical hazards, VMP1 – general, VMP3 - vegetation)
  - recognising electrical hazards
  - evaluation of risk assessment and management procedures
- procedures and protocols for access to powerline facilities and isolation of powerlines encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with accessing powerline facilities together with the relevant certification and licensing (if required)

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  - powerline access permit procedures and documentation
  - workplace signage - traffic management, unauthorised access and public protection
  - powerline distribution voltages
  - switching requirements for authorised tree trimming work on HV overhead lines - information required by system control, information to be included on the 'vicinity permit', system control functions, authorised work adjacent to an area under an access permit and communications
  - weather conditions at worksite
  - work team communications
  - adequate light at worksite
- principles of tree preservation encompassing:
  - standards, codes, legislation, supply authority regulations and/or enterprise requirements associated with endangered species
  - identifying site conditions and inspection of tree and/or vegetation - suitability of this type of tree in this location; and identifying hazards, assessing and controlling risks with this tree in this location
  - inspecting location and determining work methods for tree preservation - tree defects, tree diseases and insect attacks
  - relationship to how a tree grows to vegetation control - Australian tree families
  - tree preservation - methods of clearing vegetation, tree trimming, pruning and tree felling
  - safety work measures/methods
  - prevention of soil erosion
  - regrowth control
  - disposal of debris
  - heritage, significant and urban/rural vegetation
  - fire prone areas
- vegetation control using chemicals encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the control of vegetation using chemicals
  - chemical treatment principles - types and characteristics of chemicals to be used, regulations and procedures in handling and transporting chemicals safely, application procedures of chemicals to be used, mixing desirable quantities, pouring, spraying, and storing procedures
  - techniques in handling equipment to eliminate/reduce risks to the environment from spillages of oils, herbicides, pesticides and chemicals from equipment
  - methods of disposing and storage of herbicides, pesticides and chemicals
  - safety precautions specific to working with chemicals - safe working practices and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of personal protective equipment (PPE) (appropriate selection of complete or partial body protection and processes of inspection prior to use and cleaning after use); and dangers of working in confined spaces and at heights while using chemicals, permit to work systems

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and isolation procedures/protocols
    - safe working policies, procedures and practices when using/operating specialised chemical equipment
    - emergency response and rescue, including first aid
    - reasons and provisions of material safety data sheets (MSDS)
    - precautions in the use of machinery, plant, equipment and tools when working with chemicals
    - required safety techniques in the handling of herbicides - use and application of chemical agents, transporting and storage of chemicals and solvents, cleaning of equipment used in applications, and procedures for spillages and contamination outside of vegetation control area
- enterprise-specific policies and procedure instructions encompassing:
    - 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 well-being, 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.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRVC24 Assess vegetation and recommend control measures in an ESI environment

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 assessment of vegetation, and in particular trees, for defects and hazards prior to cutting and pruning around live powerlines up to the live work zone as defined for both instructed and authorised persons in the industry guidelines associated with live electrical apparatus. The assessment is compiled and recorded in accordance with requirements and/or established procedures for defined species of vegetation and/or particular tree types.

Also included is the preparation of risk assessment control measures that encompass job safety assessment and compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone, including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

Competency Field

Vegetation

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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 and plan to conduct assessment of vegetation and, recommend control measures for work near live electrical apparatus	**1.1** Work instructions are identified and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed are discussed with all personnel to establish and confirm the work schedule
	1.3 WHS/OHS policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Recommendations to assist in meeting assessment of vegetation and recommendation of control measures for working near live electrical apparatus outcomes are made to others involved in the work
	1.5 Hazards are identified and WHS/OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures
	1.6 Scope of responsibility under the relevant work permits/access authorisations are received and confirmed with relevant personnel according to requirements and established procedures
	1.7 Resources, including, equipment, tools and personal protective equipment (PPE), required for the job are identified and, where to be used, confirmed in working order according to established procedures
	1.8 First aid, pole top rescue and/or other related work safety procedures at the worksite are identified in accordance with requirements and established

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		procedures to ensure safety measures are followed in the instance of an incident
	1.9	Client issues are identified and referred to appropriate personnel in accordance with industry/community standards
	1.10	Work schedule is prepared to produce a quality outcome, and sustainable energy principles and practices followed to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures
	1.11	Road signs, barriers and warning devices are identified, where appropriate, in accordance with given instructions and requirements
2 Conduct assessment of vegetation and, recommend control measures for work near live electrical apparatus	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are identified for inclusion in the assessment report according to requirements confirmed to eliminate the prospects of incidents
	2.3	Operational knowledge for the assessment of vegetation and recommendation of control measures for working near live electrical apparatus to be applied to the work is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	Assessment of vegetation, and in particular trees, for defects is undertaken in accordance with established procedures
	2.5	Analysis of assessment results and recommendations are made of vegetation control measures to be deployed for working near live electrical apparatus in accordance with requirements and/or established procedures
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are monitored and reported/referred to immediate authorised personnel for directions according to established procedures

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	2.7	Non-routine events are responded to and referred to immediate authorised personnel for directions according to established procedures
	2.8	Problems associated with the assessment of vegetation and the recommendation of control measures for working near live electrical apparatus are attended to using acquired known solutions and skills to ensure requirements and established procedures are met
	2.9	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete the assessment of vegetation and recommend control measures for work near live electrical apparatus	**3.1**	Work undertaken is checked against work schedule and anomalies reported to authorised personnel in accordance with established procedures
	3.2	Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures
	3.3	Worksite is made safe in accordance with given instructions and established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Appropriate personnel are notified of work completion according to established procedures
	3.6	Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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

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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 UETTDRVC24A Assess vegetation and recommend control measures in an ESI environment.

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 UETTDRVC24 Assess vegetation and recommend control measures in an ESI environment

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
- confirming operational knowledge associated with the assessment of vegetation and making recommendations prior to working near live electrical apparatus, in all of the following:
  - principles of electricity and the three phase power system
  - power system
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe working zone defined by relevant authorities
  - use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures
  - system control - information required and function
  - vicinity permit - information required and function
  - sensitive earth fault system
  - environmental principals and procedures
  - safe approach distances (SAD) for insulated cranes and plant
  - SAD for persons and handheld tools
- confirming safe practices associated with the assessment of vegetation and making recommendations prior to working near live electrical apparatus, in all of the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - release and rescue
  - role of the safety observer
  - events constituting an incident
  - procedures in the event of/responding to incidents

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  - methods of identifying hazards
  - risk assessment procedures
  - selection of the best position for monitoring and controlling work (cutting)
  - selection of correct line of site to the cutter
  - correct observation of the work from ground level
  - constant analysis and decision making relevant to the safety of the work taking into account prevailing site conditions (lay of the land) and ongoing weather conditions
- confirming vegetation control associated with the assessment of vegetation and making recommendations prior to working near live electrical apparatus in all of the following:
  - identifying tree types
  - confirming vegetation species and types
  - confirming vegetation cutting techniques for different vegetation
  - confirming appropriate vegetation machinery and equipment to be used
  - using feeder route plans
  - conducting calculations related to loading and slinging
- confirming the safe assessment of vegetation and making recommendations prior to working near live electrical apparatus in all of the following:
  - safely using tools, plant and equipment
  - safely storing, transporting and using chemicals
  - conducting pre -and post-operational checks, inspections and minor maintenance on tools and equipment
  - safely deploying machinery and equipment in varying conditions and weather
  - safely using of appropriate personal protective equipment (PPE)
  - safely cutting/pruning and tree trimming methods
  - correctly advising on vegetation species, types and characteristics
  - correctly advising on cutting plans relevant to the vegetation species and type
  - analysing vegetation control measures, particularly of trees for defects
  - safely assessing vegetation for defects and hazards
  - correctly recommending appropriate pruning and/or cutting processes to be used near live electrical apparatus
  - preparing assessment reports with appropriate recommendations for course of action
- 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:

- principles of conducting assessment of the condition and type of vegetation for the purpose of controlling its growth away from live lines encompassing:
  - standards, codes, Commonwealth/state/territory legislation, supply authority regulations, permit requirements and/or enterprise requirements associated with the

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cutting/pruning/controlling the growth of vegetation around live powerlines up to the HV live work zone as defined for both instructed and authorised persons in the industry guidelines associated with live electrical apparatus
  - techniques in established procedures for defining species of vegetation and tree characteristics, including obvious tree defects and hazards
  - techniques in selecting the relevant and suitably appropriate vegetation removal method
  - techniques in identifying obvious hazards and risk assessment control measures that encompass job safety assessment and compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus
  - techniques in determining the appropriate safe working methods up to the defined "safe working zone" near energised electrical apparatus (including electrical powerlines) for non-electrical worker/ordinary persons
  - safety precautions working on vegetation control - safe working clearances from live line; identifying WHS/OHS hazards; assessing and controlling WHS/OHS risks; types, selection, maintenance and uses of PPE; permit to work systems and isolation procedures; safe working practices when using specialised equipment; and emergency response and rescue, including first aid, working at heights and in confined spaces
  - techniques in establishing the appropriate safe work methods and/or type of plant, tools and/or equipment to control vegetation - the selection of the most appropriate tools, such as chainsaws, mowers, saws, trimmers and/or the most appropriate chemical applicator
  - use and application of plant, tools and equipment use to control vegetation - chainsaws, mowers, saws, trimmers and chemicals
  - techniques in communicating and relaying information to other personnel
  - techniques in compiling and recording assessment data collected
- enterprise-specific vegetation control equipment encompassing:
  - types and application of vegetation mulching tools
  - types and application of herbicide application equipment
  - purpose and use of cutting plans relevant to the vegetation type
  - cutting techniques of vegetation control tools and equipment
  - types of PPE used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection and general protection.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 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, 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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UETTDRVC25 Use elevated platform to cut vegetation above ground level near live electrical 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 cutting and/or pruning vegetation above ground level and removal of vegetation obstructions, up to the live work zone as defined for both authorised and instructed persons in the industry guidelines associated with live electrical apparatus, using the established cutting plan relevant to the vegetation type. It encompasses the safe use of appropriate/specialised tools and equipment according to requirements and established procedures. It includes safely accessing trees from above ground level to install restraints/slings, removing tree limbs in a safe manner, and clearing debris from the felling site to eliminate the occurrence of electrical incidents. It does not include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones are in compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite body, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

The application of the skills and knowledge described in this unit may require a licence to operate specific pieces of equipment such as elevated work platforms.

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

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

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UETTDRVC33 Apply pruning techniques to vegetation control near live electrical apparatus

Competency Field

Vegetation

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 cut/prune vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using an elevating platform	**1.1** Work instructions and cutting plan are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed in accordance with the cutting are discussed with all personnel to establish and confirm the work schedule
	1.3 WHS/OHS policies and procedures to be followed for the work to be performed are received and confirmed
	1.4 Suggestions to assist and/or improve meeting the cutting of vegetation above ground level outside the live work zone near electrical apparatus outcomes are made to others involved in the work
	1.5 Hazards are identified and WHS/OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures
	1.6 Scope of responsibility under the relevant work permits/access authorisations is identified according to requirements and established procedures with relevant personnel

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	1.7	Resources, including, equipment, tools, approved platforms and personal protective equipment (PPE), required for the job are obtained and, in working order according to established procedures
	1.8	Relevant responsibilities associated with first aid, working aloft, and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.9	Client issues, including environmental values, are identified and referred to appropriate personnel in accordance with industry/community standards
	1.10	Site is prepared to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with established procedures
	1.11	Road signs, barriers and warning devices are obtained and positioned in accordance with given instructions and requirements
	1.12	Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus according to requirements and established procedures
	1.13	Work permits/access authorisations are confirmed and received, where applicable, for commencement of the work according to requirements and established procedures with relevant personnel
2 Carry out the cutting/pruning of vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using an elevating platform	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements to eliminate the prospects of

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		incidents
	2.3	Operational knowledge for the cutting of vegetation above ground level outside the live work zone near electrical apparatus is confirmed to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements and established procedures
	2.4	Cutting of vegetation above ground level outside the live work zone near electrical apparatus using an elevated work platform (EWP) is carried out in accordance with the cutting plan, work schedule, given instructions and established procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are monitored and reported/referred to immediate authorised personnel for directions according to established procedures
	2.6	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
	2.7	Problems associated with cutting vegetation above ground level outside of the vegetation exclusion zone near electrical apparatus are attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and established procedures are met
	2.8	Ongoing checks of quality of the work are undertaken in accordance with given instructions and established procedures
3 Complete the cutting/pruning of vegetation above ground up to the vegetation exclusion zone near live electrical apparatus using an elevating platform	**3.1**	Work undertaken is checked against cutting plan and work schedule and anomalies reported to authorised personnel in accordance with established procedures
	3.2	Accidents and/or incidents are actioned and reported to authorised personnel in accordance with established procedures
	3.3	Worksite is rehabilitated, cleaned up, made safe and sustainable energy principles and practices applied in

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accordance with given instructions and established procedures or an agreed standard

3.4 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.5 Appropriate personnel are notified of work completion according to established procedures

3.6 Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools/platform are conducted according to requirements

3.7 Requirements for returning work permits and/or access authorisation permits are confirmed, where applicable

3.8 Work completion records and report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDRVC25A Use elevated platform to cut vegetation above ground level near live electrical 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 UETTDRVC25 Use elevated platform to cut vegetation above ground level near live electrical 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
- confirming operational knowledge associated with the cutting vegetation above ground outside live work zone near live electrical apparatus using an elevated work platform (EWP) in all of the following:
  - principles of electricity and the three phase power system
  - power system
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe working zone and ordinary person zone so defined by relevant authorities
  - use of technical standards, acts, regulations, codes/guidelines and established/enterprise/asset owner's procedures
  - system control - information required and function
  - vicinity permit - information required and function
  - sensitive earth fault system
  - environmental principals and procedures
- performing safe practices associated with the cutting vegetation above ground outside live work zone near live electrical apparatus using an EWP in all of the following:
  - WHS/OHS practices and procedures
  - electric shock and resuscitation
  - release and rescue and height safety, including platform aerial emergency rescue procedure
  - role of the safety observer
  - events constituting an incident

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  - procedures in the event of/responding to incidents
  - methods of identifying hazards
  - risk assessment procedures for both worksite and pre-job checklist
  - selection of the best position for monitoring and controlling work (cutting)
  - selection of correct line of site to the cutter
  - correct observation of the work from ground level
  - constant analysis and decision making relevant to the safety of the work taking into account prevailing site conditions (lay of the land) and ongoing weather conditions
- using an EWP whilst performing all of the following:
  - identifying tree types
  - confirming vegetation species and types
  - confirming vegetation cutting techniques for different vegetation
  - confirming appropriate vegetation machinery and equipment to be used
  - using feeder route plans
- performing the safe cutting/pruning of vegetation above ground outside live work zone near live electrical apparatus using an EWP in all of the following:
  - using cutting plans relevant to the vegetation type
  - safely using of all relevant personnel protective equipment (PPE)
  - safely operating restraints, slings, lifting and loads
  - safely using tools and equipment, such as hand saws, chainsaws, specialised tools and equipment and/or power pruners above ground on an EWP
  - safely using chemical control and application above ground on an EWP
  - safely using regulatory and/or approved industry cutting/pruning platforms
  - safely working aloft on an EWP and undertaking cutting, pruning and tree trimming techniques near electrical apparatus
  - conducting pre- and post-operational checks, inspection and minor maintenance
  - safely deploying equipment and tools in varying ground conditions and weather
  - safely removing debris
- 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:

- techniques in operating tools and equipment from an EWP encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the operating of tools and equipment from a platform
  - types of EW’s used for vegetation control
  - advantages and disadvantages of each type of EWP
  - types of pre-operational checks on EWPs

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  - electrical test requirements e.g. test and certify periodically
  - transporting and storage methods
  - safety precautions when using EWPs
  - proper use of EWPs
  - earthing of the EWP
  - proper methods of mounting and alighting EWPs
  - hydraulic tools
  - use of insulated EWPs - insulated EWP operator
  - EWP operational techniques on a platform - height safety and working aloft
  - understanding of definitions of drop zone and full zone
  - safety precautions specific to working on EWPs - safe working practices and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of PPE, including harnesses; dangers of working in confined spaces and at heights while on an EWP; role of safety observer; permit to work systems and isolation procedures/protocols
  - safe working policies and procedures
- enterprise-specific vegetation control equipment encompassing:
  - types and application of vegetation cutting tools – chainsaws, hydraulic pruning saws, tool line and specialised pruning tools (cocky beaks and pruning saws)
  - purpose and use of cutting plans relevant to the vegetation type
  - cutting techniques of vegetation control tools and equipment
  - techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf bottom-back cut technique, and side scarf opposite back-cut technique
  - techniques in safe methods of controlling the descent of vegetation in an electrical environment - safety procedures, including safety ropes and lines; checking and setting up equipment; load calculations/estimations; techniques in using lowering equipment; determining the serviceability of ropes and other lowering devices
  - pre-operational checks on vegetation control tools and equipment
  - techniques in safely using vegetation control equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, and precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, and possible fire danger due to sparks)
  - types of PPE used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection and general protection
  - basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement, and testing for compliance to manufacturer and WHS/OHS requirements.

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, 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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UETTDRVC26 Cut vegetation at ground level near live electrical 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 involves the skills and knowledge required to cut vegetation at ground level near live electrical apparatus in the electricity supply industry (ESI).

It includes cutting and/or pruning vegetation at ground level, removing vegetation obstructions up to the live work zone as defined for both instructed and authorised persons in accordance with legislation or industry guidelines associated with live electrical apparatus.

It includes using the established cutting plan relevant to the vegetation type and the safe use of appropriate/specialised tools and equipment in accordance with requirements and workplace procedures. It also includes safely accessing trees to install restraints/slings, removing small trees in a safe manner and clearing debris from the felling site to eliminate the occurrence of electrical incidents. It DOES NOT include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

It also includes preparing risk assessment control measures that encompass job safety assessment, complying with relevant State or Territory regulatory agencies/bodies, local government legislation, industry bi-partite body guidelines/codes of practice or other related requirements for safe work and access near live electrical and mechanical apparatus.

This competency standards unit shall apply to transmission, distribution, rail traction, telecommunications and vegetation management control industry sectors.

The application of the skills and knowledge described in this unit may require a licence to operate specific pieces of equipment such as elevated work platforms.

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

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

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UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

Competency Field

Vegetation

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 cut/prune vegetation at ground level up to vegetation exclusion zone near live electrical apparatus	**1.1** Relevant work instructions and cutting plans are received and confirmed
	1.2 Job requirements are discussed with relevant personnel and performed in accordance with workplace procedures
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) and environmental workplace procedures are received and confirmed
	1.4 Suggestions to assist and/or improve meeting the cutting of vegetation at ground level outside of the live work zone near electrical apparatus outcomes are made to others involved in the work
	1.5 Hazards are identified, WHS/OHS risks are assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are received and scope of responsibility determined in accordance with workplace procedures
	1.7 Resources, including vehicles, equipment, tools and

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		personal protective equipment (PPE), required for the job are obtained and confirmed in working order in accordance with workplace procedures
	1.8	Relevant responsibility associated with first aid and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and workplace procedures to ensure safety measures are followed in the instance of an incident
	1.9	Client issues are referred to appropriate personnel in accordance with workplace procedures
	1.10	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.11	Traffic management is checked as implemented in accordance with workplace procedures
	1.12	Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus in accordance with requirements and workplace procedures
	1.13	Work permits/access authorisations are confirmed and received, where applicable, for commencement of the work in accordance with requirements and workplace procedures with relevant personnel
2 Carry out the cutting/pruning of vegetation at ground level up to vegetation exclusion zone near live electrical apparatus	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents in accordance with workplace procedures
	2.2	Requirements for lifting, climbing, working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.3	Cutting vegetation at ground level outside of the live work exclusion zone near electrical apparatus is confirmed to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4	Cutting of vegetation at ground level outside of the live work zone near electrical apparatus is performed in

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		accordance with cutting plans, work schedules and workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported/referred to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Unplanned events are referred to relevant authorised personnel for directions in accordance with workplace procedures
	2.7	Problems associated with cutting vegetation at ground level outside of the vegetation exclusion zone near electrical apparatus are attended to using acquired known solutions and skills related to routine procedures to ensure work instructions and workplace procedures are met
	2.8	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the cutting/pruning of vegetation at ground level up to vegetation exclusion zone near live electrical apparatus	**3.1**	Completed work is checked against work schedule, cutting 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 cleaned and confirmed 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 personnel are notified of work completion in accordance with workplace procedures
	3.6	Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools are conducted in accordance with requirements
	3.7	Relevant work permits are signed off in accordance with workplace procedures

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3.8 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 UETTDRVC26A Cut vegetation at ground level near live electrical 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 UETTDRVC26 Cut vegetation at ground level near live electrical 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
- confirming operational knowledge associated with the cutting of vegetation at ground level near live electrical apparatus in all the following:
  - principles of electricity, the three-phase power system
  - power system
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe working zone and ordinary person zone so defined by relevant authorities
  - use of technical standards, acts, regulations, codes /guidelines and established/enterprise/asset owner's procedures
  - system control - information required and function
  - vicinity permit - information required and function
  - sensitive earth fault (SEF) System
  - confirm environmental principals and procedures
- confirming safe practices associated with the cutting of vegetation at ground level near live electrical apparatus in all the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - release and rescue
  - role of the safety observer
  - events constituting an incident
  - procedures in the event of or responding to incidents
  - methods of identifying hazards
  - risk assessment procedures for both worksite and pre-job checklist

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  - selection of the best position for monitoring and controlling work (cutting)
  - selection of correct line of site to the cutter
  - correct observation of the work from ground level
  - constant analysis and decision making relevant to the safety of the work, considering prevailing site conditions (lay of the land) and on-going weather conditions
- confirming vegetation control associated with the cutting of vegetation at ground level near live electrical apparatus in all the following:
  - identifying tree types
  - confirming vegetation species and types
  - confirming vegetation cutting techniques for different vegetation
  - confirming appropriate vegetation machinery and equipment to be used
  - using = feeder route plans
- confirming the safe cutting of vegetation at ground level near live electrical apparatus in all the following:
  - using cutting plans relevant to the vegetation type
  - safely using of all relevant personnel protective equipment (PPE)
  - safely using tools and equipment, such as hand saws, chainsaws, specialised tools and equipment and/or power pruners at ground level
  - safely using chemical control and application at ground level
  - safely using cutting, pruning and tree trimming techniques at ground near electrical apparatus
  - safe stump removal
  - conducting pre- and post-operational checks, inspections and minor maintenance on tools and equipment
  - safely deploying equipment and tools in varying ground conditions and weather
  - safely removing debris
- 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:

- enterprise-specific vegetation control equipment, including:
  - types and application of vegetation cutting tools – chainsaws, brush cutters, hydraulic pruning saws, tool line and specialised pruning tools (cocky beaks and pruning saws)
  - types and application of vegetation mulching tools
  - types and application of herbicide application equipment
  - purpose and use of cutting plans relevant to the vegetation type
  - cutting techniques of vegetation control tools and equipment
  - techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf-bottom-back cut technique, and side scarf opposite back-cut technique

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- pre-operational checks on vegetation control tools and equipment
- techniques in safely using vegetation control equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, length of power lead and possible fire danger due to sparks)
- types of PPE used in conjunction with vegetation control equipment - head protection, eye protection, hearing protection, hand protection, foot protection, body protection and general protection
- basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement, and testing for compliance to manufacturer and WHS/OHS 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 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, 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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UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

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 monitor safety compliance of vegetation control work in an electrical supply industry (ESI) environment.

It includes observing, spotting, rendering warnings to stop unsafe work activities, and/or encroachment of ordinary persons, public, personnel and mobile plant and equipment into the safe approach distance (SAD) as defined for persons and mobile plant and equipment. A person designated as a safety observer and solely dedicated to the role normally carries out this work.

It also includes the preparation of risk assessment control measures, including job safety assessment. All work and zones are undertaken in compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite body guidelines/codes of practice or other related requirements for safe work and access near live electrical and mechanical apparatus.

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

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

Competency Field

Vegetation

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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 control and monitor safety compliance for vegetation work near live electrical apparatus	**1.1** Work plan and workplace procedures are received, confirmed and communicated with relevant personnel
	1.2 Work is prioritised and sequenced for completion within acceptable timeframes following consultation with relevant personnel and in accordance with workplace procedures
	1.3 Work health and safety (WHS)/occupational health and safety (OHS) and environmental workplace procedures are obtained and confirmed
	1.4 Person designated as safety observer acknowledges and confirms responsibilities of role
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed in accordance with workplace procedures
	1.7 Suitable communication methods between the safety observer and vegetation control worker are identified and confirmed
	1.8 Resources, including equipment, tools and personal protective equipment (PPE), required for the job are obtained and confirmed in working order in accordance with workplace procedures
	1.9 Communication barriers between the safety observer and vegetation control workers are identified and confirmed

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	1.10	Client issues are referred to appropriate personnel in accordance with workplace procedures
	1.11	Worksite is prepared to minimise risk, damage to property, commerce and individuals in accordance with workplace procedures
	1.12	Work schedule is prepared to produce a quality outcome, follow sustainable energy principles and practices, and to minimise risk and damage to property, commerce, stock and individuals in accordance with workplace procedures
	1.13	Traffic management is checked as implemented in accordance with workplace procedures
2 Perform control and monitoring of safety compliance for vegetation work near live electrical apparatus	**2.1**	WHS/OHS, sustainable energy and environmental principles and practices are monitored and followed to reduce incidents of accidents in accordance with workplace procedures
	2.2	Requirements for lifting, climbing, working at heights and the use of power tools/equipment are followed in accordance with workplace procedures
	2.3	Person designated as safety observer positions themselves to obtain an unobstructed view of the vegetation control work
	2.4	Safety compliance is controlled and monitored for vegetation work near live electrical apparatus in accordance with cutting plans and workplace procedures
	2.5	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported/referred to immediate authorised personnel for directions in accordance with workplace procedures
	2.6	Unplanned events are referred to relevant authorised personnel for directions in accordance with workplace procedures
	2.7	Work is performed in accordance with cutting plans and workplace procedures
	2.8	Problems associated with the control of safety compliance and monitoring for vegetation work near live electrical apparatus is responded to using acquired

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		known solutions and skills related to routine procedures to ensure work instructions and workplace procedures are met
	2.9	Quality checks of work are undertaken in accordance with industry standards and workplace procedures
3 Complete the control and monitoring of safety compliance for vegetation work near live electrical apparatus	**3.1**	Completed work is checked against work schedule, cutting 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, and sustainable energy principles and practices applied in accordance with given instructions and workplace procedures or agreed standards
	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 personnel are notified of work completion in accordance with workplace procedures
	3.6	Relevant work permits are signed off in accordance with workplace procedures
	3.7	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 UETTDRVC27A Monitor safety compliance of vegetation control work in an ESI environment.

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 UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

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
- confirming operational knowledge associated with the monitoring safety compliance for vegetation work near live electrical apparatus in all the following:
  - principles of electricity, the three-phase power system
  - power system
  - recognition of aerial voltage systems
  - identification of low voltage (LV) aerial circuits
  - identification of high voltage (HV) aerial circuits
  - safe working zone and ordinary person zone so defined by relevant authorities
  - use of technical standards, acts, regulations, codes/guidelines and established/enterprise/asset owner's procedures
  - switching requirements for authorised tree trimming work on voltage overhead lines
  - system control - information required and function
  - vicinity permit - information required and function
  - sensitive earth fault (SEF) system
  - confirm environmental principals and procedures
- confirming safe practices associated with the monitoring safety compliance for vegetation work near live electrical apparatus in all the following:
  - WHS/OHS safety practices and procedures
  - electric shock and resuscitation
  - release and rescue
  - role of the safety observer
  - events constituting an incident
  - procedures in the event of/responding to, incidents
  - selection of the best position for monitoring and controlling work (cutting)

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  - selection of correct line of sight to the cutter
  - correct observation of the work from ground level
  - constant analysis and decision making relevant to the safety of the work, considering prevailing site conditions (lay of the land) and on-going weather conditions
- confirming hazards and risk assessment procedures associated with the monitoring safety compliance for vegetation work near live electrical apparatus in all the following:
  - identifying hazards
  - conducting risk assessment procedures
  - conducting worksite hazard assessment
  - identifying essential components of hazards assessment checks
  - identifying pre-job hazard assessment check (HAC) items
  - conducting worksite hazard and risk assessment checklist
  - identifying procedures for planned inspection
- confirming vegetation control associated with the monitoring safety compliance for vegetation work near live electrical apparatus in all the following:
  - identifying tree types
  - confirming vegetation species and types
  - confirming vegetation cutting techniques for different vegetation
  - confirming appropriate vegetation machinery and equipment to be used
  - using feeder route plans
  - conducting calculations related to loading and slinging
  - identifying duties of safety observers at the worksite
- 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:

- responsibilities of a safety observer, including:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the duties and responsibilities of a safety observer
- areas of responsibility, such as:
  - understanding of their responsibilities
  - the responsibilities of others at the worksite
  - importance of not getting involved in anything else
- enterprise-specific protocols and procedures
- emergency response and rescue, including first aid
- enterprise-specific duties of a safety observer
- techniques in observing others in the safe performance of their work, including:
  - understanding of the work to be undertaken

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- safe approach distances (SAD) for:
  - vehicles
  - plant/equipment
  - people
  - hand-held tools
- vegetation
- special limits of approach for authorised persons only
- proximity to electrical and telecommunications 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 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, 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

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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UETTDRVC29 Control vegetation whilst performing linework

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 control vegetation whilst performing linework in the electricity supply industry (ESI).

It includes controlling vegetation including tree trimming, working near live low voltage (LV) conductors as specified in the relevant legislation, the completion of inspection reports and updating records in accordance with workplace requirements.

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

UEENEEG101A Solve problems in electromagnetic devices and related circuits

UEENEEG102A Solve problems in low voltage a.c. circuits

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL12 Operate plant and equipment near live electrical conductors and apparatus

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS52 Install and maintain poles, structures and associated hardware

UETTDRIS54 Install and maintain poles, structures and overhead conductors and cables

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Competency Field

Vegetation

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 control vegetation	**1.1** Work schedules, construction 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 the control of vegetation near live LV conductors 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 identified in accordance with workplace procedures
	1.6 Relevant work permits are confirmed and signed 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

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	1.9	Traffic management plan is confirmed as being applied in accordance with workplace procedures
2 Control vegetation	**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	Vegetation near live LV conductors is monitored to ensure completion in agreed timeframes, to quality standards and with minimum waste in accordance with workplace procedures
	2.4	Vegetation control is performed in accordance with work schedule, job requirements and workplace procedures
	2.5	Unplanned events in vegetation control are responded to in accordance with workplace procedures
	2.6	Quality checks of work are undertaken in accordance with workplace procedures
3 Complete vegetation control	**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 and equipment returned to service in accordance with workplace procedures
	3.6	Work records, reports and/or documentation 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC29A Control vegetation whilst performing linework.

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 UETTDRVC29 Control vegetation whilst performing linework

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
- conducting vegetation control work from at least one (1) of the following:
  - non-conductive ladder
  - elevated work platform (EWP)
  - ground level
- undertaking vegetation control measures using at least two (2) of the following:
  - hand clearing
  - specialised tools and equipment
  - machinery assisted clearing
  - herbicidal clearing
- 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:

- ecological principles, including:
  - interdependence of plants, animals, the soil and the environment
  - environment
  - habitats
  - the food chain
- soil and erosion control principles, including:
  - soil types
  - simple tests

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  - types of erosion
  - theory of erosion prevention and control
  - land degradation control
  - functions of trees in the environment
- basic anatomy and physiology, including:
  - plant morphology
  - internal anatomy
  - growth patterns and habits
  - simple physiology
- tree hazard assessment, including:
  - symptoms of stress in trees
  - diagnosing tree problems
  - assessments for line clearance
  - personal hazards
  - the tree's response to wounding and decay
  - theory of compartmentalisation
  - tree stability (damage to root systems due to excavation)
  - principles of pruning
  - branch collars
- standards, codes, legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the control of vegetation, including:
  - clearance zones and approach distances from overhead power lines
  - legislation associated with easement access and maintenance
  - appropriate personal protection equipment (PPE)
  - equipment maintenance and safety precautions
- tree climbing and pruning, including:
  - chainsaw safety and maintenance
  - basic cross-cutting techniques
  - simple felling
  - use of EWP
  - safe climbing with ropes and harnesses
  - use of chainsaws in the tree
  - cutting techniques
  - roping techniques
  - chemical control of foliage and the required safety techniques
  - practical work on-site with a range of trees
- easement management, including:
  - legislation relating to easement access and maintenance
  - use of chemicals and herbicides and provision of material safety data sheets (MSDS) for

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those substances
- use of machinery and plant
- access tracks.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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 controlling vegetation whilst performing linework
- 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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UETTDRVC30 Coordinate vegetation control operations

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 coordination and implementation of continuous vegetation control and takes into account arboreal regeneration, environmental issues and liaison and consultation procedures with appropriate government agencies, property owners and environmental groups. It also encompasses conducting and/or contributing to public education processes and legislation issues.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL11 Apply sustainable energy and environmental procedures

UETTDREL16 Working safely near live electrical apparatus

UETTDRIS62 Implement and monitor the power system organisational WHS/OHS policies, procedures and programs

UETTDRIS63 Implement & monitor power system environmental & sustainable energy management policies & procedures

Competency Field

Vegetation

Unit Sector

Not applicable.

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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/plan to coordinate vegetation control work	**1.1** Work schedules, including drawings, plans, requirements, established procedures and material lists, are obtained and analysed, as necessary, by site inspection and the extent of the preparation of the work determined for planning and coordination
	1.2 Work is prioritised and sequenced for the most efficient and effective outcome following consultation with others for completion within acceptable timeframes, to a quality standard and in accordance with established procedures
	1.3 Risk control measures are identified, prioritised and evaluated against the work schedule
	1.4 Relevant requirements and established procedures for the work are communicated to all personnel and identified for all worksites
	1.5 Hazards are identified, WHS/OHS risks assessed and control measures are prioritised, implemented and monitored, including emergency exits kept clear, to ensure safe systems of work are followed and according to established procedures
	1.6 Relevant work permits are secured to coordinate the performance of work according to requirements and/or established procedures
	1.7 Resources, including personnel, equipment, tools and personal protective equipment (PPE), required for the job are identified, scheduled and coordinated and confirmed safe and in technical working order
	1.8 Clients/customers are provided with possible solutions and/or options within the scope, acceptable cost and requirements
	1.9 Liaison and communication issues with others/authorised personnel, authorities, clients and land owners are resolved and activities coordinated to carry out work

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	1.10	Personnel participating in the work, including plant operators and contractors, are fully briefed and respective responsibilities coordinated and authorised where applicable in accordance with established procedures
	1.11	Site is prepared according to the work schedule and to minimise risk and damage to property, commerce and individuals in accordance with established procedures
	1.12	Positioning of road signs, barriers and warning devices is planned in accordance with requirements
2 Carry out the coordination of vegetation control work	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are monitored and actioned in accordance with requirements and/or established procedures
	2.2	First aid, pole top rescue and other related work procedures are performed according to requirements and/or established procedures
	2.3	Lifting, climbing, working aloft, and use of power tools/equipment, techniques and practices are safely exercised according to requirements
	2.4	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks are reported to immediate authorised persons for directions according to established procedures
	2.5	Remedial actions are taken to overcome any shortfalls encountered in the work schedule according to requirements and/or established procedures
	2.6	Coordination of vegetation control work is carried out in accordance with the work schedule and requirements and/or established procedures
	2.7	Essential knowledge and associated skills are applied in the safe coordination of vegetation control work to ensure completion in an agreed timeframe and to quality standards with a minimum of waste according to requirements
	2.8	Solutions to non-routine problems are identified and actioned using acquired essential knowledge and associated skills according to requirements

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	2.9	Ongoing checks of quality of the work are undertaken in accordance with requirements and established procedures to ensure a quality outcome is achieved for the client/customer and to a community/industry standard
3 Complete the coordination of vegetation control work	**3.1**	Work undertaken is checked against work schedule for conformance with requirements, anomalies reported and solutions identified in accordance with established procedures
	3.2	Accidents and/or injuries are reported and followed up in accordance with requirements/established procedures
	3.3	Worksite is rehabilitated, cleaned up and confirmed safe in accordance with established procedures
	3.4	Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures
	3.5	Relevant work permits are signed off and equipment returned to service and client/customer advised in accordance with requirements
	3.6	Work completion records, reports, as installed/modified drawings and/or documentation and information are confirmed, processed and appropriate 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 UETTDRVC30A Coordinate vegetation control operations.

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Links

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Assessment Requirements for UETTDRVC30 Coordinate vegetation control operations

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
- using tools, equipment, materials and workplace procedures, including at least three (3) of the following clearing methods:
  - hand clearing
  - machinery assisted clearing
  - growth retardants
  - fire clearing
  - herbicidal clearing
- coordinating operations from two (2) of the following levels:
  - ladder
  - elevated work platform (EWP)
  - tree
  - ground
- considering all of the following:
  - personnel aspects
  - material aspects
  - financial aspects
- 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:

- principles of high voltage (HV) encompassing:
  - Commonwealth/state/territory legislation, standards, codes, supply authority regulations

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and/or enterprise requirements associated with working on or near HV

- electrical and electrostatic principles related to HV lines - relationship of current, voltage and resistance as related to transmission lines, relationship of phase voltage and respective line voltages
- production of an electric field – units, effect of distance, potential of an object within the field and the effect of distances to the potential
- HV insulators - construction of a disc insulator, construction of a polymeric insulator, effects of an electrical field on disc insulators, identification of the number of disc insulators needed for a single line voltage, and performance of a failed disc insulator on the line and the system
- determining the minimum allowable number of discs per string for each line voltage in the system before bare hand work is to proceed
- techniques in detecting a failed disc in a string
- techniques in using appropriate tools and equipment to test a string
- methods of recording data
- effects of electrostatic induction on the human body - relationship of the resistance of a human body to different levels of current and voltage, relationship of a human body to an electric field, and effects of electrostatic induction on bare hand work
- application of Faraday's cage - effects of a body, advantages, description of the Faraday's cage used by bare hand live line workers
- safety precautions working on or near HV electrical apparatus - safe approach distances from live line; identification of WHS/OHS hazards; assessing and controlling risks; types, selection, maintenance, storage and uses of personnel protective equipment (PPE); permit to work systems and isolation procedures
- types and function of specialised live working equipment
- safe working policies, procedures and practices when using and operating specialised equipment
- methods of using specialised equipment
- emergency response and rescue, including first aid
- effects of lighting and switching surges on performance of string insulators - health effects to workers
- methods used to alleviate surges on transmission lines
- magnetic field - difference between magnetic fields and electrostatic fields; source of magnetic field; techniques in locating, measuring and analysing known sources of magnetic fields; reasons for monitoring magnetic field exposure and techniques used to monitor magnetic fields

- ecological principles for vegetation control encompassing:
  - ecological principles - interdependence of plants, animals, the soil and the environment; environment; habitats and the food chain
  - soil and erosion control principles - soil types, simple tests, types of erosion, theory of erosion prevention and control, land degradation control and functions of trees in the environment
  - basic anatomy and physiology - plant morphology, internal anatomy, growth patterns and

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habits, and simple physiology
    - tree hazard assessment encompassing: - symptoms of stress in trees, diagnosing tree problems, assessments for line clearance, personal hazards, the tree's response to wounding and decay, theory of compartmentalisation and tree stability (damage to root systems due to excavation)
    - principles of pruning
    - branch collars
- control of vegetation encompassing:
    - standards, codes, legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the control of vegetation - clearance zones and approach distances from overhead power lines, legislation associated with easement access and maintenance, appropriate PPE, equipment maintenance and safety precautions
    - tree climbing and pruning - chainsaw safety and maintenance, basic cross-cutting techniques, simple felling, use of EWPs, safe climbing with ropes and harnesses, use of chainsaws in the tree, cutting techniques, roping techniques, chemical control of foliage and the required safety techniques, and practical work on-site with a range of trees
    - easement management - legislation relating to easement access and maintenance, use of chemicals and herbicides and provision of material safety data sheets (MSDS) for those substances, use of machinery and plant, and access tracks
- working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker encompassing:
    - standards, guidelines/codes of practice, state/territory/local government legislation, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker
    - definitions of terminologies - 'safe working zone' 'risk assessment', 'safe approach distances zones (SAD)', 'safe working distances'.' work permits', access authorisation permits', 'technical standards' 'isolation procedures' and 'compliance requirements'
    - WHS/OHS policies and procedures for working safely - emergency response and first aid procedures, such as cardiopulmonary resuscitation (CPR); roles and responsibilities of employers, employees and other parties under WHS/OHS legislation; PPE; identifying hazards; assessing and controlling WHS/OHS risks; duties of a safety observer; working at heights/confined spaces; permit to work systems and isolation procedures; safe application of different types of tools and equipment; and operation of mobile plant and machinery (e.g. EWP) near live electrical apparatus
    - electricity supply infrastructure assets and voltages
    - techniques and precautions in undertaking different work functions and working safely up to the defined safe working zone near energised electrical apparatus, including electrical powerlines, for non-electrical worker - work functions that may be performed, including vegetation control, scaffolding, rigging, painting, and/or any other activity that requires working safely near live electrical apparatus by a non-electrical worker
- coordination of vegetation control inspection programs encompassing:
    - Commonwealth/state/territory/local government legislation/regulations, standards, codes,

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supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to coordinating the inspection of vegetation control: - clearance zones and approach distances from overhead power lines, legislation associated with easement access and maintenance, and use and operation of plant and equipment, such as EWPs, chainsaws/pole saws and stump grinders

- appropriate PPE
- equipment maintenance and safety precautions
- endangered plants/animals/insects
- soil erosion
- chemical treatment
- provision of manufacturer and supplier information, such as MSDSs
- traffic management control plan
- alternative engineering solutions for vegetation management
- emergency response and first aid procedures
- techniques in the inspection of vegetation to determine action required - diagnosing tree problems and systems of stress in trees; identification of fall zone; identification of WHS/OHS hazards; assessing and controlling risks; safety policies, procedures and precautions; responsibilities and protocols for team members; procedures for obtaining electrical access authorities and procedures for coordination of operations
- techniques in determining the resources required for a particular vegetation control project
- techniques in determining the condition of the tools and equipment needed for a particular vegetation control project
- techniques in determining the duration and cost of the vegetation control project
- techniques in relaying information to team members - safe precautions and procedures; clearances zones and approach distances; proper selection, maintenance, use and storage of PPE; procedures regarding safe use of equipment, including pre-operational checks for serviceability; and procedures in the safe transporting, use, storage and disposal of chemicals
- procedures for removal of vegetation
- techniques in record keeping of data.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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

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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 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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UETTDRVC31 Operate specialist equipment at ground level near live electrical 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 the operation and routine maintenance of specialised plant and equipment at ground level near live electrical apparatus. It includes carrying out pre-operational checks, calibrating equipment, reporting faults and maintaining operational records and an awareness of workplace safety and positive environmental practices associated with specialised plant and equipment operation. It also includes traffic control measures and compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe use of equipment near live electrical and mechanical apparatus.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning for the removal of vegetation around live powerlines up to the live work zone, including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

Competency Field

Vegetation

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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 operate and conduct routine maintenance of specialised plant and equipment near live electrical apparatus	**1.1** Specialised plant and equipment are selected appropriate to job requirements and confirmed against work instructions
	1.2 Routine pre-operational checks of machinery and equipment are carried out to manufacturer specifications for safe use near live electrical apparatus according to requirements and established procedures
	1.3 Plant and/or equipment are securely attached and/or calibrated for operation to manufacturer specifications
	1.4 Faulty plant and equipment are identified, safety tagged, and reported to supervisor according to enterprise requirements
	1.5 WHS/OHS hazards in the workplace are identified, risk assessed and reported according to enterprise requirements
2 Operate specialised plant and equipment near live electrical apparatus	**2.1** Specialised plant and equipment are operated in a safe and controlled manner, and monitored for performance and efficiency
	2.2 Risks to self, others and the environment are recognised and minimised according to enterprise and WHS/OHS requirements
	2.3 Suitable personal protective equipment (PPE) WHS/OHS requirements
	2.4 Environmental implications associated with plant and equipment operation are identified, assessed and reported to the supervisor

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3 Complete the operation and routine maintenance of ground level specialised plant and equipment near live electrical apparatus	**3.1**	Plant and equipment shutdown procedures are carried out to manufacturer specifications and enterprise requirements
	3.2	Plant and equipment operational records are maintained according to enterprise requirements
	3.3	Plant and equipment damage, malfunctions or irregular performance are recorded and/or reported according to enterprise requirements
	3.4	Post-operational checks, minor maintenance and/or relevant documentation of plant and equipment are conducted according to requirements
	3.5	Appropriate personnel are notified of work completion according to established procedures
	3.6	Plant and equipment are cleaned, secured and stored according to manufacturer specifications and enterprise 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC31A Operate specialist equipment at ground level near live electrical 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 UETTDRVC31 Operate specialist equipment at ground level near live electrical 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
- using at least three (3) of the following specialist equipment:
  - chippers
  - stump grinders
  - brush cutters
  - slashers/tritters
  - power pruners
  - chemical control applicators
- performing all of the following:
  - pre-start and safety checks according to manufacture specifications
  - checking and confirming equipment calibration settings and operating methods
  - observing and monitoring noise levels for correct operation
  - preparation of independently powered tools, including cleaning, priming, tightening, basic repairs and adjustments
  - identifying and segregating unsafe or faulty equipment for repair or replacement
  - pre- and post-operational checks, inspections and minor maintenance
  - safe deployment of machinery and equipment in varying conditions and weather
- interpreting and applying all of the following:
  - standard operating procedures (SOPs)
  - industry standards
  - production schedules
  - material safety data sheets (MSDS)
  - work notes
  - product labels
  - manufacturer specifications

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  - operator manuals
  - enterprise policies and procedures (including waste disposal, recycling and re-use guidelines)
  - supervisors oral or written instructions
  - work and routine maintenance plans
- determining WHS/OHS hazards encountered in the workplace, including all of the following:
  - exposure to:
    - loud noise
    - fumes
    - solar radiation
    - dust
    - ergonomic hazards associated with posture and vibration
    - hazardous substances (fuel, oils and fertiliser)
    - oil and grease spills
  - presence of:
    - bystanders
    - livestock and wildlife
    - difficult terrain and varying gradients
    - potholes
    - ditches
    - gullies
    - embankments
    - obstacles (rocks, logs fences, debris and buildings)
    - extreme weather conditions
    - electricity
    - overhead powerlines
    - mechanical malfunctions and exposed moving parts, and other machinery, including hydraulics
- selecting and using specialised plant and equipment
- using operational techniques for the specific terrain (on and off-road environments) and weather conditions
- maintaining working loads within specifications, including ensuring hitch-points are operated at the correct height
- confirming what personal protective equipment (PPE) is relevant including the following:
  - boots
  - hat/hard hat
  - overalls
  - gloves
  - protective eyewear
  - hearing protection

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  - respirator or facemask
  - sun protection (sun hat and sunscreen)
- confirming environmental implications associated with the operation of machinery and equipment, including all of the following:
  - negative environmental impacts may result from excessive noise and exhaust emissions, the incorrect use and disposal of maintenance debris (oils, containers and chemical residues), and hazardous substances (fuel and fertiliser) – impacts including run-off flows of water and cleaning agents from servicing, maintenance and cleaning activities, soil disturbance and dust problems from high speed and frequent traffic (including irrigation equipment)
- confirming what procedures are included in the shutdown of machinery and equipment, including the following:
  - safe dismount procedures (including turning engine off), maintaining a clear thoroughfare, parking away from hazards, securing, engaging handbrake, removing keys, refuelling and cleaning
- 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:

- enterprise-specific vegetation control equipment encompassing:
  - safety policies, procedures and precautions with regards to using, transporting and storage of specialised plant and machinery
  - legislation, standards, codes, supply authority regulations and specific enterprise regulations pertaining to the use and care of specialised plant and machinery
  - characteristics, capabilities and application of specialised plant and machinery for a particular job
  - types and application of vegetation cutting tools – chainsaws, brush cutters, hydraulic pruning saws, tool line and specialised pruning tools (cocky beaks and pruning saws)
  - types, selection and application of vegetation mulching tools and specialist equipment
  - types and application of herbicide application equipment
  - purpose and use of cutting plans relevant to the vegetation type
  - cutting techniques of vegetation control tools and specialist equipment
  - techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf bottom-back cut technique, and side scarf opposite back-cut technique
  - pre-operational checks on vegetation control tools and equipment
  - techniques in safely using vegetation control specialist equipment - visual inspection of vegetation control equipment, methods of using equipment at heights and in confined spaces, and precautions to note during use of equipment (proximity of other personnel, proximity of powerlines and obstacles, length of power lead and possible fire danger due to sparks)
  - types of PPE used in conjunction with vegetation control equipment - head protection,

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eye protection, hearing protection, hand protection, foot protection, body protection and general protection
- basic maintenance of vegetation control equipment - cleaning, proper storage, basic repair and replacement and testing for compliance to manufacturer and WHS/OHS 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 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, 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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UETTDRVC32 Use specialised plant to cut vegetation above ground level near live electrical 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 removal of vegetation above ground level, up to the live work zone as defined for both authorised and instructed persons in the industry guidelines associated with live electrical apparatus, using the established cutting plan relevant to the vegetation type. It encompasses the safe use of specialised plant and equipment according to requirements and established procedures. It includes safely accessing trees from ground level to remove tree limbs in a safe manner. It does not include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones are in compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning and the removal of vegetation around live powerlines up to the live work zone, including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

UETTDRVC33 Apply pruning techniques to vegetation control near live electrical apparatus

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Competency Field

Vegetation

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 Select and prepare specialised plant for use near live electrical apparatus	**1.1** Specialised plant is selected and prepared to job requirements and confirmed against work plan
	1.2 Routine pre-operational checks of specialised plant are completed to manufacturer specifications and enterprise requirements
	1.3 WHS/OHS hazards in the workplace are recognised, risk assessed and minimised according to enterprise requirements
	1.4 Requirements for safe working procedures and legislation during transport are recognised and followed
	1.5 Procedures and risk control measures are in place and followed in the event of an incident
	1.6 Incidents are appropriately reported according to established procedures
2 Operate specialised plant near live electrical apparatus	**2.1** Plant is operated in a safe and controlled manner and monitored for performance and efficiency
	2.2 Risks to self, others and the environment are anticipated and minimisation strategies implemented accordingly
	2.3 Suitable personal protective equipment (PPE) is selected, used, maintained and stored according to WHS/OHS requirements

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	2.4	Environmental implications associated with specialised plant operation are identified, assessed and reported according to established procedures
	2.5	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
3 Complete operations and report on specialised plant operation near live electrical apparatus	**3.1**	Shutdown procedures for specialised plant are completed to manufacturer specifications and enterprise requirements
	3.2	Specialised plant operational records are completed and maintained according to enterprise requirements
	3.3	Malfunctions, faults, irregular performance and damage to specialised plant are detailed and reported according to enterprise requirements
	3.4	Specialised plant is cleaned, secured and stored according to manufacturer specifications, WHS/OHS and enterprise 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UETTDRVC32A Use specialised plant to cut vegetation above ground level near live electrical 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 UETTDRVC32 Use specialised plant to cut vegetation above ground level near live electrical 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
- operating specialised plant, including at least three (3) of the following:
  - mechanical tree trimmer
  - boom-operated mower
  - boom-operated groomer
  - hedger
- conducting routine pre-operational checks of specialised plant and equipment, including all of the following:
  - pre-start and safety checks according to manufacture specifications
  - checking and confirming equipment calibration settings and operating methods
  - observing and monitoring noise levels for correct operation
  - preparing independently powered tools, including cleaning, priming, tightening, basic repairs and adjustments
  - identifying and segregating unsafe or faulty equipment for repair or replacement
  - pre and post operational checks, inspections and minor maintenance
  - safe deployment of machinery and equipment in varying conditions and weather
- interpreting and applying all of the following:
  - standard operating procedures (SOPs)
  - industry standards
  - production schedules
  - material safety data sheets (MSDSs)
  - work notes
  - product labels
  - manufacturer specifications

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  - operator manuals
  - enterprise policies and procedures (including waste disposal, recycling and re-use guidelines)
  - supervisors oral or written instructions
  - work and routine maintenance plans
- determining WHS/OHS hazards encountered in the workplace including, all of the following:
  - exposure to:
    - loud noise
    - fumes
    - solar radiation
    - dust
    - ergonomic hazards associated with posture and vibration
    - hazardous substances (fuel, oils, fertiliser)
    - oil and grease spills
  - presence of:
    - bystanders
    - livestock and wildlife
    - difficult terrain and varying gradients
    - potholes
    - ditches
    - gullies
    - embankments
    - obstacles (rocks, logs, fences, debris and buildings)
    - extreme weather conditions
    - electricity
    - overhead powerlines
    - mechanical malfunctions and exposed moving parts, and other machinery, including hydraulics
- selecting and using specialised plant and equipment
- using operational techniques for the specific terrain (on and off-road environments) and weather conditions
- maintaining working loads within specifications, including ensuring hitch-points are operated at the correct height
- determining personal protective equipment (PPE) required for work, including all of the following:
  - boots
  - hat/hard hat
  - overalls
  - gloves
  - protective eyewear
  - hearing protection

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  - respirator or facemask
  - sun protection (sun hat and sunscreen)
- confirming environmental implications associated with the operation of machinery and equipment including all of the following:
  - the use and disposal of maintenance debris and hazardous substances
  - run-off flows of water and cleaning agents from servicing maintenance and cleaning activities
  - soil disturbance and dust problems
- confirming what procedures are included in the shutdown of machinery and equipment according to manufacturer SOPs
- 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:

- enterprise-specific vegetation control specialised plant encompassing:
  - types and application of specialised plant – sky trim, bushy, jarraff, hedging tractor, and timber pro (harvester)
  - purpose and use of cutting plans relevant to the vegetation type
  - cutting techniques of vegetation control specialised plant
  - techniques in undertaking different branch cuts - scarf under-cut, top cut technique, top scarf bottom-back cut technique, and side scarf opposite back-cut technique, including size of cut
  - definitions of drop zone and full zone
  - pre-operational checks on vegetation control specialised plant
  - electrical test requirements e.g. test and certify periodically
  - techniques in safely using vegetation control specialised plant - visual inspection of vegetation control specialised plant, methods of using equipment at heights and in confined spaces, and precautions to note during use of specialised plant (proximity of other personnel, proximity of powerlines and obstacles, role of safety observer, length of power lead and possible fire danger due to sparks)
  - types of PPE used in conjunction with vegetation control specialised plant - head protection, eye protection, hearing protection, hand protection, foot protection, body protection and general protection
  - basic maintenance of vegetation control specialised plant - cleaning, proper storage, basic repair and replacement, and testing for compliance to manufacturer and WHS/OHS requirements.

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, 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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UETTDRVC33 Apply pruning techniques to vegetation control near live electrical 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 involves the skills and knowledge required to apply pruning techniques to perform vegetation control near live electrical apparatus in the electricity supply industry (ESI).

It includes applying vegetation pruning principles and techniques in accordance with relevant industry standards to achieve statutory vegetation clearance requirements near live electrical apparatus up to live work zone as defined for both authorised and instructed persons in the industry guidelines associated with live electrical apparatus. Pruning activities may be performed from ground or above ground level.

It also includes the preparation of risk assessment control measures including job safety assessments, adhering to relevant State or Territory regulatory agencies/bodies, local government legislation, industry bi-partite body guidelines/codes of practice or other related requirements for safe work and access near live electrical and mechanical apparatus.

It does not include the full gamut of rigging techniques and practices required of a Rigger or entry into to the safe approach distance (SAD) as defined for persons, mobile plant, equipment and specialised tools.

This unit of competency applies to the transmission, distribution, rail traction, telecommunications and vegetation management control industry sectors.

The application of the skills and knowledge described in this unit may require a licence to operate specific pieces of equipment such as elevated work platforms.

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

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live

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electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

Competency Field

Vegetation

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 Identify pruning principles and pruning techniques	**1.1** Pruning principles are identified in an arboriculture context
	1.2 Differentiation between formative, corrective and preventative pruning is identified
	1.3 Poor pruning practices effecting the shape and future structure of various tree species are identified
	1.4 Pruning requirements for various situations and plant types growing in proximity to power lines are detailed
	1.5 Principles of natural target pruning are identified and applied in accordance with industry standards
	1.6 Branch collars, branch bark ridge and the sequence for branch removal are identified
2 Prepare for pruning near live electrical apparatus	**2.1** Pruning instructions are obtained and confirmed
	2.2 Pruning tools and equipment are selected in accordance with the location, access and size of material to be pruned
	2.3 Pre-operational and safety checks are carried out on pruning tools and equipment in accordance with

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		manufacturer specifications and enterprise work procedures
	2.4	Pruning tools and equipment are prepared for use
	2.5	Suitable safety and personal protective equipment (PPE) are selected, used and maintained
3 Undertake pruning near live electrical apparatus	**3.1**	Pruning site is suitably signed and barricaded during pruning operations in accordance with workplace procedures
	3.2	Plant material to be pruned or removed is carried out in accordance with relevant industry standards
	3.3	Pruning activities near live electrical apparatus are undertaken in accordance with workplace procedures and work health and safety (WHS)/occupational health and safety (OHS)requirements
	3.4	Pruning tools and equipment are operated safely and effectively
	3.5	Hygiene practices are observed during pruning operations
4 Complete pruning activity near live electrical apparatus	**4.1**	Prunings and waste material removed from the site are disposed of in an environmentally aware and safe manner in accordance with enterprise work procedures
	4.2	Correct manual handling techniques are used when lifting or moving heavy loads
	4.3	Pruning tools and equipment are cleaned, maintained and stored in accordance with enterprise work procedures
	4.4	A clean and safe area is maintained throughout and on completion of work
	4.5	Workplace records are maintained in accordance with enterprise guidelines

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 UETTDRVC33A Apply pruning techniques to vegetation control near live electrical 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 UETTDRVC33 Apply pruning techniques to vegetation control near live electrical 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
- demonstrating correct pruning principles and techniques, including all of the following:
  - shaping, forming, correcting or controlling growth
  - preventing disease or damage
  - promoting health
  - controlling capacity and vigour,
  - providing clearance for electrical assets
- demonstrating all the following WHS/OHS requirements:
  - identifying hazards
  - assessing and reporting risks
  - cleaning
  - maintaining and storing tools and equipment
  - appropriate use of personal protective equipment (PPE), including sun protection
  - drinking to avoid dehydration
  - safe operation of tools and equipment
  - correct manual handling
  - basic first aid
  - personal hygiene and reporting problems to supervisors
- demonstrating all the following:
  - identifying potential hazards
  - practical application of legislation and codes of practice
  - implementing control measures to eliminate/reduce hazards/incidents
  - applying incident reporting/recording/investigation procedures
  - applying safe manual handling techniques

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- demonstrating appropriate selection of all the following pruning equipment:
  - ropes
  - handsaws
  - hand and battery-powered secateurs
  - pneumatic snips and compressor
  - hedge trimmers both manual and powered
  - small chainsaws and hydraulic and motorised pole-saws
- determining PPE required to undertake pruning activities, including all of the following:
  - hat/hardhat
  - boots
  - overalls
  - gloves
  - protective eyewear
  - respirator or face mask
  - face guard
  - hearing protection
  - sunscreen lotion
- determining the following hygiene management practices required while pruning:
  - sterilisation of clothing, tools and equipment
  - management of debris removal
- demonstrating the correct cutting angle for all the following:
  - branch bark ridge
  - stem bark ridge
  - co-dominant stem
  - visible branch collar
- 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:

- pruning principles near powerlines, including:
  - reasons for pruning around powerlines
  - identifying site conditions - inspection methods of vegetation to be pruned, what to look for, determination of worksite working area, identification of possible endangered species, identification of appropriate PPE to be used, identification of the location of plant, tools, equipment and fellow workmates for safe work practices
  - inspecting location and determining work methods
  - principles of correct pruning practice - types of pruning (formative, corrective, preventative and natural target pruning)

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- cutting techniques - different branch cuts (single top-cut technique, single under-cut, handsaw technique for light small branches, chainsaw technique for heavy branches, single side-cut technique, step cut-under-cut then a top cut technique, scarf under-cut then top-cut technique, top scarf-bottom-back cut technique, side scarf then opposite back-cut technique, spear-cut technique, and snipping/cutting back overhang (lv)
- correct pruning practices (AS 4373-2017 Pruning of amenity trees) according to enterprise requirements
- effects of pruning - incorrect pruning, how much to prune and size of cut.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, 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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UETTDRVC34 Undertake release and rescue from a tree near live electrical 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 the process of release and rescue of a tree climber working near live electrical apparatus, where an injured or unconscious tree climber is safely brought to the ground from a tree. Rescue and release safe working procedures requires hazard identification, basic first aid and emergency procedures, and tree climbing techniques. Release and rescue are likely to be undertaken in emergency situations with little or no supervision. Discretion and judgement are required in the selection of equipment, organisation of rescue, and associated actions. Competency is demonstrated by the application of knowledge and skills to a range of rescue tasks and roles usually within established enterprise guidelines.

It includes safely accessing trees from above ground level to install restraints/slings, removing tree limbs in a safe manner, and clearing debris from the felling site to eliminate the occurrence of electrical incidents. It does not include entry of persons, mobile plant, equipment, and/or specialised tools into to the safe approach distance (SAD) as defined.

Also included is the preparation of risk assessment control measures that encompass job safety assessment. All work and zones are in compliance with relevant state or territory regulatory agencies/bodies, local government legislation, industry bi-partite bodies, guidelines/codes of practices or other related requirements for safe work and access near live electrical and mechanical apparatus.

The skills and knowledge described in this unit may only be practiced under the regulations pertaining to each state and territory for the safe planning and removal of vegetation around live powerlines up to the live work zone, including near live electrical apparatus, and regulations that directly relate to work health and safety (WHS)/occupational health and safety (OHS) and/or contracts of training where they apply.

Pre-requisite Unit

Common Unit Group

UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

UETTDREL13 Comply with sustainability, environmental and incidental response policies and procedures

UETTDREL14 Working safely near live electrical apparatus as a non-electrical worker

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UETTDRVC23 Plan the removal of vegetation up to vegetation exclusion zone near live electrical apparatus

UETTDRVC27 Monitor safety compliance of vegetation control work in an ESI environment

Competency Field

Vegetation

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 release and rescue from a tree near live electrical apparatus	**1.1** WHS/OHS policies and procedures to be followed for the work to be performed are received and confirmed
	1.2 Relevant requirements and established procedures to be followed for the work to be performed in accordance with the aerial rescue are discussed with all personnel to establish and confirm the work schedule
	1.3 Enterprise electrical apparatus and voltages are identified and safe working clearances and conductive path determined
	1.4 Rescue equipment and first aid kit are checked to ensure they are complete and placed within easy access
	1.5 Resources, including, equipment, tools, approved platforms and personal protective equipment (PPE), required for the job are selected, checked in working order and maintained according to established procedures
	1.6 Emergency communication system used to summon emergency services is checked according to manufacturer specifications and enterprise work procedures

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	1.7	Emergency plan is confirmed and clarified with work team prior to work being undertaken
	1.8	Hazards are identified and WHS/OHS risks associated with working near live electrical apparatus are identified and reported according to established procedures
	1.9	Scope of responsibility under the relevant work permits/access authorisations is identified according to requirements and established procedures with relevant personnel
	1.10	Relevant responsibilities associated with first aid, working aloft, and/or other related work safety procedures at the worksite are confirmed in accordance with requirements and established procedures to ensure safety measures are followed in the instance of an incident
	1.11	Road signs, barriers and warning devices are obtained and positioned in accordance with given instructions and requirements
	1.12	Pre-operational checks are undertaken to confirm safe and correct operation of tools and equipment for safe use near live electrical apparatus according to requirements and established procedures
2 Carry out the release and rescue from a tree near live electrical apparatus	**2.1**	WHS/OHS and sustainable energy principles and practices to reduce the incidents of accidents and minimise waste are followed in accordance with given instructions, requirements and/or established procedures
	2.2	Lifting, climbing, working aloft, and use of tools/equipment, techniques and practices are safely followed in accordance with given instructions and according to requirements to eliminate the prospects of incidents
	2.3	Operational knowledge for the release and rescue from a tree near electrical apparatus is confirmed according to requirements and established procedures
	2.4	Emergency situation is assessed and emergency management plan activated according to enterprise requirements and established procedures
	2.5	Assistance is requested from work team and/or public according to requirements and enterprise procedures,

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		where required
	2.6	Hazard warnings and safety signs are recognised and hazards and assessed WHS/OHS risks monitored and suitable controls implemented/reported/referred to immediate authorised personnel for directions according to established procedures
	2.7	Appropriate access equipment to effect rescue is identified according to enterprise standards
	2.8	Nature of the injury is assessed according to established procedures
	2.9	Casualty and rescuer are safely secured according to enterprise standards
	2.10	Injuries are assessed to determine whether or not to move casualty based on standard first aid procedures and risk assessment
	2.11	Casualty with possible neck or spinal injuries is supported (but not moved) to await expert medical treatment
	2.12	First aid able to be performed above ground is applied, as required, in line with standard procedures
	2.13	Instructions to ground staff and climbers are communicated clearly and concisely according to established procedures
	2.14	Casualty is prepared for descent according to first aid and risk assessments
	2.15	Casualty is lowered safely to the ground with support of rescuer
	2.16	Non-routine events are referred to immediate authorised personnel for directions according to established procedures
3 Complete the release and rescue from a tree near live electrical apparatus	**3.1**	First aid is applied on the ground according to need and industry standard procedures
	3.2	Emergency assistance is obtained in accordance with emergency plan
	3.3	Accidents and/or incidents are actioned and reported to

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authorised personnel in accordance with established procedures

3.4 Worksite is rehabilitated, cleaned up, made safe and sustainable energy principles and practices applied in accordance with given instructions and established procedures or an agreed standard

3.5 Tools, equipment and any surplus resources and materials are, where appropriate, cleaned, checked and returned to storage in accordance with established procedures

3.6 Appropriate personnel are notified of work completion according to established procedures

3.7 Post-operational checks, minor maintenance and/or relevant documentation of equipment and tools/platforms are conducted according to requirements

3.8 Work completion records of release and rescue, report forms/data sheets are completed accurately in accordance with given instructions and 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 UETTDRVC34A Undertake release and rescue from a tree near live electrical 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 UETTDRVC34 Undertake release and rescue from a tree near live electrical 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
- confirming all of the following:
  - WHS/OHS safety practices and procedures
  - basic first aid, electric shock and resuscitation
  - procedures in the event of/responding to incidents
  - analysis and decision making relevant to the safety of the work taking into account prevailing site conditions (lay of the land) and ongoing weather conditions
- given a rescue situation, confirming the selection of the relevant rescue equipment from the following:
  - first aid kit
  - emergency contact numbers
  - harness
  - lifeline
  - prussik loop
  - karabiners
  - climbing spurs
  - flipline/polestrap
  - pulleys
  - tube tape
- given a rescue situation, confirming the selection of the required safety equipment from the following:
  - pedestrian barriers
  - traffic barriers
  - warning signs
  - road signs

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    - danger signs
    - flashing lights
    - traffic bollards
    - safety mesh
    - witches hats
- given a rescue situation, confirming the selection of the personal protective equipment (PPE) from the following:
    - steel cap boots
    - six point safety helmet
    - ear protection
    - eye protection
    - cut resistant trousers or chaps
    - hi vis clothing
    - close fitting work clothes
    - gloves
- confirming emergency communication systems used to summon emergency services using the following:
    - checked for good working order and adequate battery power/within range for:
        - mobile phone
        - landline
        - two-way radio
- confirming an emergency plan is put into action dealing with the following:
    - the location and selection of the appropriate emergency contact numbers for:
        - ambulance
        - medical centre police
        - fire brigade and/or electrical company
    - the site location details, such as:
        - grid reference
        - first aiders and procedures
- confirming how a casualty response may be determined incorporating all of the following:
    - verbal/non-verbal communication
    - observation
        - observation noted:
            - patient conscious
            - extent of patient injuries
            - patient ability to assist in their rescue
- identifying hazards associated with rescue that need to be assessed from all of the following:
    - electrical wires
    - energised trees and equipment
    - unstable branches or structures

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  - insect swarm
  - climbing
  - fatigue
  - moving vehicles and equipment
  - heat and cold
  - manual handling
  - presence of blood and other bodily fluids
- assessing controls are implemented to minimise the risk of WHS/OHS hazards from all of the following:
  - enterprise WHS/OHS policies and procedures
  - securing of the site
  - appropriate use of PPE
  - appropriate use of safety equipment, such as signage and protective barriers
  - safe operation of tool, equipment and machinery
  - correct manual handling
  - basic first aid available on site
  - process and procedures in reporting problems to supervisors/emergency services
  - availability of drinking liquids and warm clothing
- determining the selection and use of appropriate access equipment required to effect rescue using the following:
  - climbing spikes
  - ropes
  - climbing harness
  - safety lines
  - aerial lifts
  - ladder
  - crane or elevated work platform (EWP)
- demonstrating how the casualty will be prepared for descent incorporating the following:
  - immobilising the head and neck
  - setting life lines
  - use of slings
  - harnesses and pulleys
  - releasing the flip line
  - use of rescue stretcher
- demonstrating the following:
  - performing a release and rescue according to requirements and established procedures
- confirming the completion of the appropriate records for the release and rescue operations incorporating all of the following:
  - accident/incident reports
  - WorkCover forms

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  - risk assessment details
  - PPE issue and replacement dates
  - equipment maintenance checklists
  - safety audits
- 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:

- climbing techniques encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to climbing for the purpose of vegetation control
  - items/structures that are and are not permissible to climb for vegetation control
  - safety precautions which are specific to climbing structures for the control of vegetation - safe working practices and procedures; WHS/OHS hazards and precautions; identification of WHS/OHS hazards; assessment and control of WHS/OHS risks; types, selection, maintenance, storage and use of PPE, including harnesses; dangers of climbing in confined spaces and at heights; permit to work systems and isolation procedures/protocols; safe working policies, procedures and practices when climbing; and emergency response and rescue, including first aid
  - techniques in rigging - safety procedures, including safety ropes and lines, checking and setting up equipment, load calculations/estimations, techniques in using rigging equipment, and determining the serviceability of ropes and other lowering devices
  - load charts - safe working load estimates - field formulas, branch and trunk calculations, mathematical calculations and use of technology related to loads, slings, weights, and height
  - tree climbing and pruning practices - safe climbing with ropes and harnesses; methods of ensuring operation of safety lines and ropes; roping techniques; load bearing equipment and lifts; purposes of restraints, straps, slings, bends and hitches; purposes of pulleys, maillon rapides, lowering drum and T-bar flying capstan
- basic emergency procedures in releasing a person from an energised position encompassing:
  - Commonwealth/state/territory and local government legislation, standards, codes, supply authority regulations and/or enterprise requirements, including relevant certification and licensing applicable to the requirements of releasing a person from energised situation
  - comprehension of EC24 release and rescue - detail a range of emergency situations that may arise during climbing operations, detail of resources available at the worksite, determining climber position with respect to live power lines in an emergency, assess response requirements, and determining the appropriate PPE to be used
  - techniques in undertaking emergency response procedures for the release of a climber - assessment of priorities of procedures to follow, including isolation of supply, procedures for contacting emergency services and power supply company/asset owners, assessing the possibility of safe rescue of the climber and the factors to consider, assessing the best

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approach to rescuing the climber, and determining appropriate PPE
- techniques in climbing tree or structure
- techniques in safely removing climber from energised and/or de-energised supply
- techniques to the application of first aid procedures, including cardiopulmonary (CPR)
- techniques in lowering climber to the ground
- techniques in first aid procedures when climber is on the ground.

Assessment Conditions

Assessors must hold credentials specified within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must satisfy the Principles of Assessment and Rules 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, equipment and PPE currently used in industry
- suitable work environment, facilities, equipment and materials
- 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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AHCARB312 Use standard climbing techniques to access trees

Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Application

This unit of competency describes the skills and knowledge required to climb trees with ropes and harnesses using standard techniques for the purpose of accessing required sections of trees.

This unit applies to workers who have a range of cognitive, technical and communication skills to select and apply a specialised range of methods, ropes, equipment and information to complete routine activities and provide and transmit solutions to predictable and sometimes unpredictable problems. Work is implemented with low risk work procedures and to comply with Safe Work Method Statement documentation.

Licensing, legislative, regulatory, or certification requirements apply to this unit in some states and territories at the time of publication, and may differ according to jurisdiction. Specific determination should be sought through the relevant State or Territory. Works involving this unit of competency may be subject to local tree protection and preservation laws, and the relevant content of applicable Australian Standards.

Pre-requisite Unit

AHCARB311 Tie, dress, set and finish arborist knots

Unit Sector

Arboriculture (ARB)

Elements and Performance Criteria

Element	Performance criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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Element	Performance criteria
1. Prepare site and inspect equipment	1.1 Determine appropriate method for accessing tree – climbing or using an elevated work platform (EWP) – through discussion with work team 1.2 Determine location of above-and-below-ground services 1.3 Undertake a site-specific risk assessment by identifying work health and safety hazards and assessing risk 1.4 Confirm first aid and rescue personnel, equipment and procedures 1.5 Ensure work team member present, capable, willing and equipped to assist or perform aerial rescue operations 1.6 Prepare and carry out pre-operational and safety checks, on ropes, harnesses, tools and equipment 1.7 Select and use personal protective equipment 1.8 Record and implement work health, safety, site, environmental and traffic control measures
2. Select climbing equipment	2.1 Select harness and appropriate equipment for climbing 2.2 Inspect tree to determine low risk access route through discussion with work team and seek feedback 2.3 Estimate tree height and load in relation to safe working limits of ropes and equipment 2.4 Determine the hold, release and grip attributes of rope 2.5 Select and use dynamic rope 2.6 Select and use triple locking carabiners
3. Prepare to access tree	3.1 Tie, dress, set and finish climbing knots and hitches 3.2 Communicate with work team during operations using voice, hand and whistle signals 3.3 Maintain awareness of power line clearances 3.4 Select low risk anchor points in accordance with strength, suitability requirements and branch weight
4. Access and ascend tree	4.1 Access and ascend tree using low risk access route with harness and lanyard 4.2 Ascend using double rope with prussik technique 4.3 Ascend using trunk walking technique and foot ascenders as required
5. Descend from tree	5.1 Descend tree in a controlled manner 5.2 Remove all access equipment in a controlled manner 5.3 Clean and store access equipment 5.4 Clean and store personal protective equipment

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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

Unit Mapping Information

This unit is not equivalent to AHCARB204A Undertake standard climbing techniques.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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Assessment Requirements for AHCARB312 Use standard climbing techniques to access trees

Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Performance Evidence

The candidate must be observed climbing trees using standard climbing techniques in a safe manner. The candidate must be assessed on their ability to integrate and apply the performance requirements of this unit in a workplace setting. Performance must be demonstrated consistently over time and in a suitable range of contexts.

The candidate must provide evidence for and demonstrate:

- appropriate method for accessing tree – climbing or using an EWP – through discussion with work team
- determining location of above-and-below-ground services
- undertaking a site-specific risk assessment by identifying work health and safety hazards and assessing risk
- confirming first aid and rescue personnel, equipment and procedures
- ensuring work team member present, capable, willing and equipped to assist or perform aerial rescue operations
- preparing and carrying out pre-operational and safety checks, on ropes, harnesses, tools and equipment
- selecting and using personal protective equipment and safety equipment
- recording and implementing work health, safety, site, environmental and traffic control measures
- selecting harness and appropriate equipment for climbing
- inspecting tree to determine low risk access route through discussion with work team and seek feedback
- estimating tree height and load in relation to safe working limits of ropes and equipment
- determining the hold, release and grip attributes of rope
- selecting and using dynamic rope
- selecting and using triple locking carabiners
- tying, dressing, setting and finishing climbing knots and hitches
- communicating with work team during operations using voice, hand and whistle signals
- maintaining awareness of power line clearances

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- selecting low risk anchor points in accordance with strength, suitability requirements and branch weight
- accessing and ascending tree using low risk access route with harness and lanyard
- ascending using double rope with prussik technique
- ascending using trunk walking technique and foot ascenders as required
- descending tree in a controlled manner
- removing all access equipment in a controlled manner
- cleaning and storing climbing equipment
- cleaning and storing personal protective equipment
- use of industry standard-terminology to describe climbing and the work environment.

Knowledge Evidence

The candidate must demonstrate knowledge of:

- appropriate method of tree access
- selection of climbing or EWP access
- determination of location of above-and-below-ground services
- site-specific risk assessment
- first aid personnel, equipment and procedures
- rescue personnel, equipment and procedures
- work health, safety, site, environmental and traffic control measures
- pre-operational and safety checks, on ropes, harnesses, tools and equipment
- personal protective equipment
- types of climbing ropes
- dynamic ropes
- rope characteristics
- uses of climbing ropes
- safe working limits of ropes
- safe working limits of equipment
- defects in ropes, tools and equipment
- climbing harnesses and lanyards
- climbing equipment
- triple locking carabiners
- arborist knots
- tying knots
- dressing knots
- setting knots
- checking knots
- finishing knots
- industry voice, hand and whistle signals
- low risk access routes
- estimation of tree height

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- estimation of load
- safe working limits
- tree access techniques and equipment
- strength and suitability requirements
- double rope with prussik technique
- trunk walking and foot ascenders
- standard climbing technique
- low risk anchor points
- maintenance of awareness of power lines
- power line clearances
- controlled descent operations
- controlled removal of access equipment
- cleaning of equipment
- storage of equipment
- work health and safety measures relating to own work.

Assessment Conditions

It is an industry requirement that delivery of training and assessment in this unit provides for the explicit conditions of work team capability for aerial rescue operations. It is an industry requirement for competency in this unit that assessment must include a log record of two hundred (200) hours of standard climbing.

Assessment must be demonstrated consistently over time in a suitable range of contexts and have a productivity-based outcome. No single assessment event or report is sufficient to achieve competency in this unit.

Assessment may be conducted in a simulated or real work environment, however determination of competency requires the application of work practices under work conditions.

The mandatory equipment and materials used to gather evidence for assessment include:

- equipment:
  - standard climbing kit
  - harness
  - high decibel whistle
  - personal protective equipment (PPE)
  - first aid and emergency kit
  - rescue kit
  - traffic management kit
  - trees

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- materials:
  - climbing techniques form- standard
  - climbing log record - standard
  - hazard identification and risk control form
  - equipment and PPE check form
  - emergency preparation form
  - work communications form
  - knot identification form

Assessors must satisfy current standards for RTOs in the assessment of arboriculture units of competency.

Assessment must be conducted only by persons who have:

- arboriculture vocational competencies at least to the level being assessed
- current arboriculture industry skills directly relevant to the unit of competency being assessed

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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AHCCHM201 Apply chemicals under supervision

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Application

This unit of competency describes the skills and knowledge required to handle, transport, and apply chemicals under supervision using workplace specified chemicals and application equipment.

The unit applies to individuals working in a broad range of job contexts who undertake defined routine activities under supervision. They exercise limited autonomy within established and well-known parameters, providing solutions to a limited range of predictable problems.

State or territory licensing, legislative or certification requirements apply in some jurisdictions.

Pre-requisite Unit

Nil

Unit Sector

Chemicals (CHM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare to handle chemicals	1.1 Confirm the activity related to chemical handling to be undertaken with supervisor

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Elements	**Performance Criteria**
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	1.2 Identify and select tools and equipment required according to supervisor instructions 1.3 Identify health and safety hazards and risks and apply controls according to supervisor instructions and workplace procedures 1.4 Select, ensure serviceability, fit and use personal protective equipment (PPE)
2. Check application equipment	2.1 Carry out pre-operational checks of application equipment and identify and replace any damaged or worn components or report to supervisor 2.2 Prepare application equipment for use according to workplace practice and safe chemical handling processes
3. Handle and transport chemicals	3.1 Confirm safety precautions for the handling and transport of chemicals with supervisor 3.2 Handle and transport chemicals according to chemical label, safety data sheets and supervisor instructions
4. Prepare chemical for application	4.1 Interpret and apply chemical label instructions according to safety data sheets for the chemical or substance being used 4.2 Select and use appropriate mixing equipment 4.3 Measure, mix and load application equipment with chemical according to application rates 4.4 Clear chemical spills according to chemical label and supervisor instructions 4.5 Check that output of application equipment is correct and in accordance with chemical application plan
5. Apply chemicals	5.1 Assess and record weather conditions and forecasts prior to and during application according to workplace requirements 5.2 Apply chemical safely according to chemical application plan, chemical label and supervisor instructions 5.3 Monitor conditions for application and take appropriate action when conditions are unsuitable according to workplace procedures 5.4 Minimise risks to others, product integrity and the environment prior to and during application
6. Finalise work	6.1 Clean and store PPE and application equipment in accordance with manufacturers and health and safety in the workplace

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Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	requirements 6.2 Dispose of excess chemicals and clean containers in accordance with label instructions and regulatory requirements 6.3 Complete incident reports according to workplace procedures 6.4 Complete chemical application records according to workplace procedures 6.5 Store unused chemical and products according to workplace procedures 6.6 Adhere to all re-entry requirements for treated areas

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret instructions, chemical labels and safety documentation to identify relevant and key information to apply to mixing and application of chemicals
Writing	• Use clear language and correct concepts and terminology when reporting incidents and completing chemical application records
Numeracy	• Perform basic mathematical calculations when measuring and mixing chemicals and checking chemical application equipment
Oral Communication	• Use clear language, concepts, tone and pace appropriate when confirming chemical application parameters with supervisor
Get the work done	• Follow clearly defined instructions and sequencing, and monitors own progress for the task, seeks assistance when necessary

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status

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AHCCHM201 Apply chemicals under supervision Release 2	AHCCHM201 Apply chemicals under supervision Release 1	Minor changes to Performance Criteria for clarity Updated Performance Evidence and Knowledge Evidence	Equivalent unit

Links

Companion Volumes, including Implementation Guides, are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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Assessment Requirements for AHCCHM201 Apply chemicals under supervision

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit. There must be evidence that the individual has on at least one occasion demonstrated that chemicals have been applied under supervision, ensuring they have:

- identified hazards and risks and adopted safe work practices and used appropriate personal protective equipment (PPE) according to supervisors' instructions
- confirmed activity with supervisor and identified and selected tools and equipment necessary for the application of chemical treatment
- carried out pre-operational checks of application equipment and made it ready for operation
- handled and transported chemicals to be used according to chemical labels and supervisors' instructions
- followed directions on chemical labels and relevant safety data sheets to safely mix and prepare chemicals
- selected appropriate measuring equipment and measured, mixed and loaded application equipment with chemicals safely and correctly
- ensured chemical spills were cleared according to chemical label instruction and supervisor instructions
- checked the application equipment for output against plan and applied chemical safely complying with weather conditions
- monitored and recorded weather and applied chemical appropriate to prevailing conditions
- maintained a healthy and safe condition for the environment and others while applying and following chemical application
- cleaned application equipment and PPE and disposed of waste according to equipment manufacturer instructions, chemical label and supervisor instructions
- complied with equipment manufacturer instructions, chemical label and supervisor instructions

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- maintained chemical application records and incident reports according to workplace procedures
- stored protection equipment, application equipment and unused chemicals according to workplace procedures.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- various handling and transport techniques and requirements for chemicals
- structure and content of chemical labels and safety data sheets and their use and purpose for safe chemical application
- principles and methods of measuring, mixing and applying chemicals
- features and functions of a range of application equipment relevant to the workplace their operations, and maintenance requirements
- risk factors to be taken into account for human and animal health, spillage and environmental impact relevant to chemical use before, during and following chemical application
- basic chemical groupings and types used in the workplace, including:
  - the of mode of action
  - the impact on chemical safety
  - application methods
- paths of entry of poisons into the body and the methods of limiting exposure through practices and personal protective clothing
- maintenance practices for chemical application related equipment and PPE and disposal procedures for chemical contaminants and containers
- assessing weather conditions and the impact on safe application of chemicals
- components of a workplace chemical application plan
- chemical related records and reports and their purpose.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - skills must be demonstrated in a typical workplace environment or an environment that accurately represents workplace conditions
  - access to chemical store
- resources, equipment and materials:
  - common chemicals
  - PPE
  - chemical application equipment
  - chemical measuring and mixing equipment
- specifications:

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- workplace documents, including work instructions and procedures
- chemical labels and safety data sheets
- chemical application plan and relevant chemical application rates
- manufacturers' operation and maintenance instructions for chemical measuring and application equipment

- relationships:
  - supervisor.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides, are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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AHCMOM213 Operate and maintain chainsaws

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Application

This unit of competency describes the skills and knowledge required to safely operate a hand-held chainsaw and maintain it in working condition.

This unit applies to cross-cutting fallen timber using safe cutting techniques.

The unit applies to individuals who apply low risk work procedures and comply with worksite health and safety requirements when operating hand-held chainsaws to carry out routine work.

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

Pre-requisite Unit

Nil

Unit Sector

Machinery operation and maintenance (MOM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Assist in preparation of work-site	1.1 Identify location of worksite and fallen timber from scope of works and confirm with supervisor 1.2 Identify site hazards, assess risks and report to supervisor

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Elements	**Performance Criteria**
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	1.3 Confirm first aid and emergency personnel, equipment and procedures 1.4 Document and implement site health and safety in the workplace, environmental and traffic control measures according to workplace procedures
2. Recognise and apply workplace safety procedures	2.1 Identify hazards and risks relevant to the maintenance and operation of chainsaws and implement safe working practices to manage risks 2.2 Select, fit and use personal protective equipment according to workplace safety procedures 2.3 Confirm with supervisor relevant licensing and legislative requirements with regard to the operation of chainsaws 2.4 Transport chainsaw safely according to operation and maintenance manual
3. Check and prepare chainsaw for use	3.1 Select tools and materials required for maintenance 3.2 Conduct routine checks and maintenance prior to operation, according to chainsaw operation and maintenance manual 3.3 Calculate required fuel oil ratios prior to mixing 3.4 Mix fuel and fuel chainsaw according to operation and maintenance manual 3.5 Identify, tag, record and report chainsaw faults or malfunctions to supervisor
4. Operate chainsaw	4.1 Communicate with work team during operations using voice, hand or whistle signals 4.2 Place supports to ensure a stable base for cutting 4.3 Identify materials to be cut and position them for operation 4.4 Visually assess material to be cut for defects and embedded hazards 4.5 Determine cutting methods appropriate to material type and implement risk controls 4.6 Select and use tools associated with chainsaw use 4.7 Operate chainsaw to cross-cut timber using documented low risk work methods 4.8 Identify and report work-site communication issues to supervisor

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Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	4.9 Identify and report environmental impacts of chainsaw operation to supervisor
5. Complete and check chainsaw operation	5.1 Record and report chainsaw damage, malfunction and irregular performance according to workplace procedures 5.2 Clean and store chainsaw according to workplace procedures and operation and maintenance manual 5.3 Dispose of debris from operation in accordance with environmental requirements 5.4 Maintain workplace documentation according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret textual information from a range of sources to identify relevant and key information about workplace operations
Writing	• Document site health and safety in the workplace, environmental and traffic control measures
Oral communication	• Use clear language to report hazards and risks and to confirm work site, first aid and emergency personnel, equipment and procedures • Participate in verbal exchanges to respond to questions and clarify information
Numeracy	• Calculate fuel oil ratios and fuel quantities
Navigate the world of work	• Recognise and follow workplace requirements, including safety requirements, associated with own role and area of responsibility
Interact with others	• Use verbal and non-verbal communications with work team during operations using voice, hand and whistle signals

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Range of Conditions

This section specifies 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.

Personal protective equipment must include:	• safety helmet • mesh visor • gloves • hearing protection • safety glasses or goggles • safety boots.
Routine checks and maintenance must include at least two of the following:	• checking and adjusting bar • cleaning air filter • cleaning and/or replacing spark plug • sharpening chain.
Supports must include at least one of the following:	• fallen timber • saw horse trestle • v-shaped supports.
Cutting methods must include:	• pulling chains cuts (bottom of bar) • pushing chainsaw cuts (top of bar) • bore / plunge cuts (tip of bar).
Tools must include:	• bars • chains • files • plug spanner.

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
AHCMOM213 Operate and maintain chainsaws Release 2	AHCMOM213 Operate and maintain chainsaws Release 1	Minor changes to performance criteria and range of conditions	Equivalent unit

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Links

Companion Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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Assessment Requirements for AHCMOM213 Operate and maintain chainsaws

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit. There must be evidence that the individual has safely operated a hand-held chainsaw at least once, maintained it in working condition and demonstrated the following:

- determined site location for work and work details and clarified with supervisor
- identified site hazards, assessed risks and reported to supervisor
- confirmed work zone with work crew and monitored site
- confirmed first aid and emergency personnel, equipment and procedures
- applied hazard and risk assessment and implemented controls for chainsaw use
- performed routine checks and maintenance for chainsaw usage according to operation and maintenance manual
- identified, tagged and reported chainsaw faults and malfunctions
- recorded and implemented site health and safety in the workplace, environmental and traffic control measures
- used personal protective equipment that complies with Australian Standards
- safely cross-cut fallen timber using compression and tension cuts with a hand held chainsaw
- used appropriate tools and materials to maintain chainsaw
- applied environmentally responsible workplace practices
- applied low risk work practices including stopping, disengaging quickly and dealing with foreign matter
- cleaned and stored chainsaw
- followed workplace procedures relevant to safely operating a chainsaw.

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Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- the principles and practice for operating chainsaws
- chainsaw routine checks and maintenance according to operation and maintenance manual, including:
  - checking and adjusting bar
  - cleaning air filter
  - cleaning and replacing spark plug
  - sharpening chain
- workplace safe operating procedures
- hazards and risks when operating a chainsaw
- relevant Australian Standards concerning chainsaw operation including use of personal protective equipment
- components of chainsaws and their respective functions
- common defects in woody materials
- cutting methods and techniques, patterns and sequence of cuts
- health and safety in the workplace requirements for the operation of a chainsaw including caution and hazard signs and symbols
- environmental impacts associated with operating chainsaws.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
  - personal protective equipment must be worn whilst operating chainsaw
  - individual must not be under the influence of alcohol or drugs
  - individual must not be taking any medication (prescribed or otherwise) that may impair judgement
- resources, equipment and materials:
  - chainsaws
  - chainsaw tools
  - wood
  - safety equipment and personal protective equipment applicable to the task being undertaken
- specifications:
  - chainsaw manufacturer specifications and operator manuals
- timeframes:
  - according to the job requirements.

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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 Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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AHCMOM304 Operate machinery and equipment

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Application

This unit of competency describes the skills and knowledge required to prepare and operate machinery and equipment in a safe and controlled manner that is used principally in agriculture, horticulture, and conservation and land management work.

This unit does not apply to chainsaws, tractors, vehicles or earth moving equipment.

The unit applies to individuals who operate machinery and equipment under broad direction, and take responsibility for their own work.

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

Pre-requisite Unit

Nil

Unit Sector

Machinery operation and maintenance (MOM)

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
1. Prepare machinery and equipment for use	1.1 Confirm activity to be undertaken, including identifying potential hazards and risks and implementing safe working practices to manage risks

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Elements	**Performance Criteria**
Elements describe the essential outcomes.	*Performance criteria describe the performance needed to demonstrate achievement of the element.*
	1.2 Source and interpret relevant machinery and equipment operation and maintenance manual and manufacturer instructions 1.3 Assess the work site and confirm the suitability of the machinery and equipment for the task 1.4 Select and maintain personnel protective equipment applicable to the machinery and equipment to be operated and the task to be undertaken 1.5 Fit and use personal protective equipment according to workplace procedures and job requirements 1.6 Conduct routine pre-operational checks as described in operation and maintenance manual 1.7 Replace and report damaged or worn components in line with workplace reporting requirements 1.8 Attach ancillary equipment and check for correct operation
2. Operate machinery and equipment	2.1 Operate machinery according to task requirements, conditions, operation and maintenance manual and manufacturer specifications 2.2 Monitor machinery performance and efficiency and make adjustments 2.3 Continually monitor hazards and risks, and ensure safety of self, other personnel, plant and equipment
3. Complete machinery and equipment operation	3.1 Conduct shut down of machinery according to workplace procedures 3.2 Perform routine operational servicing and minor maintenance according to operation and maintenance manual 3.3 Identify and report malfunctions, faults, irregular performance or damage according to workplace procedures 3.4 Clean, secure and store machinery and equipment according to workplace procedures 3.5 Maintain machinery and equipment use records in required format

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Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.

Skill	Description
Reading	• Interpret textual information from a range of sources to identify relevant and key information about workplace operations
Writing	• Document machinery and equipment use
Oral communication	• Use clear language to report malfunctions, faults, irregular performance or damage
Numeracy	• Calculate quantities of machinery fluids including oil and fuel
Navigate the world of work	• Recognise and follow workplace requirements, including safety requirements, associated with own role and area of responsibility

Range of Conditions

This section specifies 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.

Machinery and equipment must include at least one of the following:	• hydraulic equipment • stationary engines • spraying equipment • mulching and chipping equipment • powered trailers • three point linkage equipment.
Pre operational checks must include:	• machinery and equipment damage and serviceability • engine oil • fuel • machinery and equipment controls • reporting and tagging defects.

Unit Mapping Information

Code and title	Code and title	Comments	Equivalence status

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current version	**previous version**		
AHCMOM304 Operate machinery and equipment Release 2	AHCMOM304 Operate machinery and equipment Release 1	Minor changes to performance criteria, foundation skills and range of conditions	Equivalent unit

Links

Companion Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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Assessment Requirements for AHCMOM304 Operate machinery and equipment

Modification History

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 3.0.
Release 1	This version released with AHC Agriculture, Horticulture and Conservation and Land Management Training Package Version 1.0.

Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit. There must be evidence that the individual has operated agricultural or horticultural machinery and equipment at least once and has:

- identified and reported workplace hazards and implemented safe operating procedures
- carried out machinery and equipment pre-operational checks including basic servicing and maintenance according to operation and maintenance manual
- operated machinery and equipment in a safe and controlled manner consistent with task requirements, conditions, operation and maintenance manual and manufacturer specifications
- attached ancillary equipment and checked for correct operation
- carried out machinery shut down procedures
- recognised, reported and documented defects in equipment and machinery and operational capacity
- cleaned, secured and stored machinery and equipment.

Knowledge Evidence

An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:

- hazards and risks associated with machinery and equipment operation
- pre-operational and safety checks for machinery and equipment according to operation and maintenance manual
- operating principles and operating methods for machinery and equipment
- procedures for cleaning, securing and storing machinery, equipment and materials
- risks associated with the operation of machinery and equipment in different weather conditions and difficult terrain conditions

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- duty of care to self, others and the environment
- workplace procedures applicable to health and safety in the workplace requirements for operating machinery and equipment.

Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
  - individual must not be under the influence of alcohol or drugs
  - individual must not be taking any medication (prescribed or otherwise) that may impair judgement
  - individual must not be in a fatigued state when operating machinery and equipment
- resources, equipment and materials:
  - a range of machinery and equipment
  - enclosed toe shoes
  - safety equipment and personal protective equipment applicable to the machinery and equipment being used and the task being undertaken
- specifications:
  - machinery and equipment operation and maintenance manuals
  - industry and workplace biosecurity procedures applicable to machinery and equipment operation
  - records must include details of the machinery and equipment that the individual was assessed on
- timeframes:
  - according to the job requirements.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volumes, including Implementation Guides are available at VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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AHCPCM201 Recognise plants

Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Application

This unit of competency describes the skills and knowledge required to recognise commonly encountered plants. Plants include desired species as well as weeds.

It applies to individuals who work under general supervision and exercise limited autonomy with some accountability for their own work. They undertake defined activities and work in a structured context.

No occupational licensing, legislative or certification requirements are known to apply to this unit at the time of publication.

Pre-requisite Unit

Nil.

Unit Sector

Plants culture and management (PCM)

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 plant recognition	1.1 Clarify work activity instructions with supervisor 1.2 Identify any work health and safety hazards and tell supervisor 1.3 Prepare resources and equipment for use in recognition activity 1.4 Identify, select and prepare available processes for plant

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Element	Performance criteria
	recognition 1.5 Identify a range of desirable and non-desirable plants requiring recognition
2. Recognise specified plants	2.1 Carry out a visual inspection of plants 2.2 Recognise specified plants by their identifiable characteristics and name them 2.3 Record brief descriptions of plant habits, characteristics and significant features 2.4 Consult with others, browse the internet browsing, collect specimen collections, consult field guides and use workplace notetaking to assist with plant recognition 2.5 Seek advice when necessary and where appropriate to assist with plant recognition
3. Update the reference collection	3.1 Document information about plants and add to the reference collection 3.2 Update reference collection as new plants are recognised

Foundation Skills

Foundation Skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Unit Mapping Information

This unit is equivalent to AHCPCM201A Recognise plants.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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Assessment Requirements for AHCPCM201 Recognise plants

Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Performance Evidence

The candidate must be assessed on their ability to integrate and apply the performance requirements of this unit in a workplace setting. Performance must be demonstrated consistently over time and in a suitable range of contexts.

The candidate must provide evidence that they can:

- prepare resources and processes for use in recognition activity
- identify desirable and non-desirable plants requiring recognition
- recognise and describe plant attributes
- describe specific handling requirements and growth requirements
- use appropriate methods of research to assist with plant recognition
- document and update information about identified plants

Knowledge Evidence

The candidate must demonstrate knowledge of:

- principles and practices of plant recognition
  - plant morphology and physiology as they relate to recognising plants
  - plant nomenclature
  - procedures for obtaining and providing advice and information about plants
  - plant recognition techniques

Assessment Conditions

Assessors must satisfy current standards for RTOs.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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AHCPCM203 Fell small trees

Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Application

This unit of competency describes the skills and knowledge required to fell small trees where hazards have been assessed as low risk.

It is an introductory or base-level unit that covers felling procedures for small trees.

This unit applies to individuals who undertake defined activities with specialised tools and methods, work in a structured context, apply knowledge and skills to demonstrate autonomy and limited judgement, and provide solutions to a limited range of predictable problems. Work is implemented with low risk work procedures and to comply with Safe Work Method Statement documentation.

Licensing, legislative, regulatory, or certification requirements apply to this unit in some states and territories at the time of publication, and may differ according to jurisdiction. Specific determination should be sought through the relevant state or territory.

Pre-requisite Unit

AHCMOM213 Operate and maintain chainsaws

Unit Sector

Plant culture and management (PCM)

Elements and Performance Criteria

Element	Performance criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.

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Element	**Performance criteria**
1.Assist in preparation of work site	1.1 Determine location of worksite and correct tree from the scope of works 1.2 Identify site hazards, assess risks and report to supervisor 1.3 Confirm work zone with work crew and monitor site 1.4 Identify first aid and emergency personnel, equipment and procedures 1.5 Record and implement work health, safety, site, environmental and traffic control measures
2.Identify tree felling requirements	2.1 Identify hazards associated with felling operation 2.2 Assess risks and report to supervisor 2.3 Examine topography and site conditions 2.4 Identify factors influencing the tree felling operation and confirm findings with supervisor 2.5 Identify ***trees considered outside own skill level for felling*** and seek assistance from appropriate personnel 2.6 Determine natural direction of fall, safe fall zone and exclusion zone and confirm with supervisor 2.7 Receive instructions for tree felling operations from supervisor and clarify instructions prior to undertaking work
3. Prepare for tree felling	3.1 Select and prepare felling equipment and component options appropriate to the task being undertaken 3.2 Prepare, transport and appropriately position support tools to minimise felling delays 3.3 Select, check, use, maintain and store suitable safety and personal protective equipment (PPE) 3.4 Clear fall zone of obstacles and articles which may be damaged by felled tree 3.5 Establish clear escape route appropriate to site
4. Fell tree	4.1 Note and monitor location of other personnel 4.2 Carry out tree felling operation 4.3 Communicate with work team during operations using voice, hand and whistle signals 4.4 Determine standard tree felling techniques, patterns and cut sequences by ground conditions and state of canopy 4.5 Take corrective action in response to changing conditions or problems encountered 4.6 Use planned escape route when tree starts to fall 4.7 Monitor fall of tree and movement on ground until felled tree is stable 4.8 Use low risk work practices in all activities

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Element	Performance criteria
5. Complete tree felling operation	5.1 Determine appropriate method of clearing the site of felled tree 5.2 Select and use machinery required for removal of felled tree 5.3 Clear fall site of tree and all tree debris 5.4 Clean and store all machinery and equipment on completion of operation

Foundation Skills

Foundation Skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Unit Mapping Information

This unit is equivalent to AHCARB202A Fell small trees.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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Assessment Requirements for AHCPCM203 Fell small trees

Modification History

Release	TP Version	Comment
1	AHCv1.0	Initial release

Performance Evidence

The candidate must be assessed on their ability to integrate and apply the performance requirements of this unit in a workplace setting. Performance must be demonstrated consistently over time and in a suitable range of contexts.

The candidate must provide evidence that they can:

- prepare, transport and appropriately position support tools to minimise felling delays
- assess topography and site conditions, identify factors influencing tree felling operation and confirm findings with supervisor
- receive instructions for tree felling operations from supervisor and clarify prior to undertaking work
- clear fall zone of obstacles and articles which may be damaged by felled tree
- confirm first aid and emergency personnel, equipment and procedures
- identify site hazards, assess risks and report to supervisor
- record and implement work health, safety, site, environmental and traffic control measures
- select, check, use, maintain and store suitable safety and personal protective equipment
- confirm work zone with work crew and monitor location of other personnel
- determine natural direction of fall, safe fall zone and exclusion zone and confirm with supervisor
- determine standard tree felling techniques by ground conditions and state of canopy
- establish clear escape route appropriate to site
- safely operate a chainsaw to fell small trees
- monitor fall of tree and movement on ground until felled tree is stable
- take corrective action in response to changing conditions or problems encountered

Knowledge Evidence

The candidate must demonstrate knowledge of:

- corrective action
- emergency and first aid procedures
- felling equipment and components

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- first aid and emergency personnel, equipment and procedures
- ground conditions
- how to determine natural direction of fall
- how to establish a clear escape route
- industry standard terminology
- low risk work practices
- obstacles and articles which may be damaged by felled trees
- positioning support tools
- safe operating procedures for felling small trees
- safe fall and exclusion zones
- selection, preparation and appropriate equipment for task
- standard tree felling techniques, patterns and cut sequences
- topography, site conditions and other factors influencing tree felling operations

Assessment Conditions

Assessors must satisfy current standards for RTOs.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72

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BSBCUS501 Manage quality customer service

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 develop strategies to manage organisational systems that ensure products and services are delivered and maintained to standards agreed by the organisation.

It applies to individuals who supervise the provision of quality customer service within an organisation's procedures framework by others. At this level, individuals must exercise 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

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 Plan to meet internal and external customer	1.1 Investigate, identify, assess, and include the needs of customers in planning processes

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ELEMENT	PERFORMANCE CRITERIA
requirements	1.2 Ensure plans achieve the quality, time and cost specifications agreed with customers
2 Ensure delivery of quality products and services	2.1 Deliver products and services to customer specifications within organisation's business plan 2.2 Monitor team performance to consistently meet the organisation's quality and delivery standards 2.3 Help colleagues overcome difficulties in meeting customer service standards
3 Monitor, adjust and review customer service	3.1 Develop and use strategies to monitor progress in achieving product and/or service targets and standards 3.2 Develop and use strategies to obtain customer feedback to improve the provision of products and services 3.3 Develop, procure and use resources effectively to provide quality products and services to customers 3.4 Make decisions to overcome problems and to adapt customer services, products and service delivery in consultation with appropriate individuals and groups 3.5 Manage records, reports and recommendations 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, 3.1, 3.2, 3.3, 3.5	• Interprets and analyses textual information from a variety of sources and applies the knowledge that has been gained to evaluate standards for organisation's products and services
Writing	1.2, 3.1, 3.2, 3.3, 3.5	• Produces a range of text types to convey information, requirements or recommendations matching style of writing to purpose and audience
Oral Communication	1.1, 1.2, 2.1, 2.3, 3.2	• Clearly articulates systems and standards in a team environment using language suitable to diverse audiences • Uses listening and questioning techniques to obtain

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		feedback and confirm understanding
Numeracy	1.2	• Interprets and comprehends mathematical information in organisation's business and customer service plans.
Navigate the world of work	2.1, 2.2, 3.1, 3.5	• Recognises and applies organisational protocols and meets expectations associated with own work
Interact with others	1.1, 2.3, 3.4	• Identifies and uses appropriate conventions and protocols when communicating with colleagues and customers • Collaborates with others, taking into account their strengths and experience, to achieve desired outcomes • Provides support in field of expertise to team
Get the work done	1.1, 1.2, 2.1, 2.2, 3.1-3.5	• Develops and implements plans using logical processes and monitors and evaluates progress against stated goals • Accepts responsibility for addressing complex or non-routine difficulties, applying problem solving processes in determining a solution. • Uses digital technology to access, organise and present information in a format that meets requirements

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBCUS501 Manage quality customer service Release 2	BSBCUS501 Manage quality customer service 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 BSBCUS501 Manage quality customer service

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:

- develop and manage organisational systems for quality customer service
- develop and review plans, policies and procedures for delivering and monitoring quality customer service
- implement policies and procedures to ensure quality customer service
- solve complex customer complaints and system problems that lead to poor customer service
- monitor and assist teams to meet customer service requirements
- develop, procure and use human and physical resources to support quality customer service delivery.

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 legislative and regulatory context of the organisation relevant to customer service
- describe organisational policy and procedures for customer service including handling customer complaints
- identify service standards and best practice models
- summarise public relations and product promotion
- outline techniques for dealing with customers including customers with specific needs

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- explain techniques for solving complaints including the principles and techniques involved in the management and organisation of:
  - customer behaviour
  - customer needs research
  - customer relations
  - ongoing product and/or service quality
  - problem identification and resolution
  - quality customer service delivery
  - record keeping and management methods
  - strategies for monitoring, managing and introducing ways to improve customer service relationships
  - strategies to obtain customer feedback.

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:

- legislation, regulations and codes of practice related to customer service
- business technology
- workplace documentation and resources
- complex customer complaints
- 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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BSBFIM501 Manage budgets and financial plans

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 undertake financial management within a work team in an organisation. It includes planning and implementing financial management approaches, supporting team members whose role involves aspects of financial operations, monitoring and controlling finances and reviewing and evaluating effectiveness of financial management processes.

It applies to managers in a wide range of organisations and sectors who have responsibility for ensuring that work team financial resources are used effectively and are managed in line with financial objectives of the team and organisation.

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

Unit Sector

Finance - Financial 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 Plan financial management approaches	1.1 Access budget/financial plans for the work team 1.2 Clarify budget/financial plans with relevant personnel within the organisation to ensure that documented outcomes are achievable, accurate and comprehensible 1.3 Negotiate any changes required to be made to budget/financial

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ELEMENT	PERFORMANCE CRITERIA
	plans with relevant personnel within the organisation 1.4 Prepare contingency plans in the event that initial plans need to be varied
2 Implement financial management approaches	2.1 Disseminate relevant details of the agreed budget/financial plans to team members 2.2 Provide support to ensure that team members can competently perform required roles associated with the management of finances 2.3 Determine and access resources and systems to manage financial management processes within the work team
3 Monitor and control finances	3.1 Implement processes to monitor actual expenditure and to control costs across the work team 3.2 Monitor expenditure and costs on an agreed cyclical basis to identify cost variations and expenditure overruns 3.3 Implement, monitor and modify contingency plans as required to maintain financial objectives 3.4 Report on budget and expenditure in accordance with organisational protocols
4 Review and evaluate financial management processes	4.1 Collect and collate for analysis, data and information on the effectiveness of financial management processes within the work team 4.2 Analyse data and information on the effectiveness of financial management processes within the work team and identify, document and recommend any improvements to existing processes 4.3 Implement and monitor agreed improvements in line with financial objectives of the work team and the organisation

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, 2.3, 3.1-3.4, 4.2, 4.3	• Interprets and analyses information to determine activities required

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Writing	1.1, 1.4, 4.1-4.3	• Records information in correct forms and prepares materials which convey detailed and factual content in accordance with internal procedures
Oral Communication	1.2, 1.3, 2.1-2.3	• Presents information about financial issues and requirements to a range of audiences using structure and language to suit the audience • Uses active listening and questioning to clarify information and to confirm understanding
Numeracy	1.1-1.3, 2.1-2.3, 3.1-3.4, 4.1-4.3	• Uses a wide range of mathematical calculations to analyse numeric information in budgets or financial plans
Navigate the world of work	2.2, 3.3, 3.4, 4.3	• Recognises, understands and adheres to organisational requirements in undertaking own work
Interact with others	1.2, 1.3, 2.1, 2.2, 3.1, 2.3, 4.2, 4.3	• Uses a range of strategies to connect, collaborate and cooperate with other work colleagues in activities requiring collective effort and diverse skills and knowledge
Get the work done	1.1, 1.4, 2.3, 3.1-3.4, 4.1-4.3	• Uses logical processes in planning, implementing and evaluating complex tasks and developing alternative strategies in achieving goals and timelines • Uses a range of digital technologies to access, filter, compile, integrate and logically present complex information from multiple sources

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBFIM501 Manage budgets and financial plans	BSBFIM501A Manage budgets and financial plans	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 BSBFIM501 Manage budgets and financial plans

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:

- use financial skills to work with and interpret budgets, ageing summaries, cash flow, petty cash, Goods and Services Tax (GST), and profit and loss statements
- communicate with relevant people to clarify budget/financial plans, negotiate changes and disseminate information
- prepare, implement and modify financial contingency plans
- monitor expenditure and control costs
- support and monitor team members
- report on budget and expenditure
- review and make recommendations for improvements to financial processes
- meet record keeping requirements for the Australian Taxation Office (ATO) and for auditing purposes.

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 basic accounting principles
- identify and explain the relevant legislation and current requirements of the Australian Taxation Office, including the Goods and Services Tax (GST)
- explain the key requirements for financiall record keeping and auditing
- describe the principles and techniques involved in managing:
  - budgeting
  - cash flows
  - electronic spreadsheets

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- GST
- ledgers and financial statements
- profit and loss statements.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the financial management field of work and include access to:

- resources and documentation used in the workplace
- workplace policies and procedures
- workplace budgets and financial plans
- business technology
- case studies and, where available, 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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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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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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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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BSBLED501 Develop a workplace learning 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 encourage and support the development of a learning environment in which work and learning come together. Particular emphasis is on the development of strategies to facilitate and promote learning and to monitor and improve learning performance.

It applies to individuals who have a prominent role in encouraging, supporting and facilitating the development of a learning environment in which work and learning come together.

At this level work will normally be carried out within 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

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. Create learning opportunities	1.1 Identify potential formal and informal learning opportunities 1.2 Identify learning needs of individuals in relation to the needs of

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ELEMENT	PERFORMANCE CRITERIA
	the team and/or enterprise and available learning opportunities 1.3 Develop and implement learning plans as an integral part of individual and team performance plans 1.4 Develop strategies to ensure that learning plans reflect the diversity of needs 1.5 Ensure organisational procedures maximise individual and team access to, and participation in, learning opportunities 1.6 Ensure effective liaison occurs with training and development specialists and contributes to learning opportunities which enhance individual, team and organisational performance
2. Facilitate and promote learning	2.1 Develop strategies to ensure that workplace learning opportunities are used and that team members are encouraged to share their skills and knowledge to encourage a learning culture within the team 2.2 Implement organisational procedures to ensure workplace learning opportunities contribute to the development of appropriate workplace knowledge, skills and attitudes 2.3 Implement policies and procedures to encourage team members to assess their own competencies and to identify their own learning and development needs 2.4 Share the benefits of learning with others in the team and organisation 2.5 Recognise workplace achievement by timely and appropriate recognition, feedback and rewards
3. Monitor and improve learning effectiveness	3.1 Use strategies to ensure that team and individual learning performance is monitored to determine the type and extent of any additional work-based support required and any Work Health and Safety (WHS) issues 3.2 Use feedback from individuals and teams to identify and introduce improvements in future learning arrangements 3.3 Make adjustments, negotiated with training and development specialists, for improvements to the efficiency and effectiveness of learning 3.4 Use processes to ensure that records and reports of competency are documented and maintained within the organisation’s systems and procedures to inform future planning

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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
Learning	1.1, 1.2, 1.3, 1.4, 2.1, 2.4, 3.1, 3.2	• Develops strategies to develop learning plans of self and others to meet a diversity of needs within organisational constraints • Transfers skills and knowledge to a variety of learning development contexts
Reading	1.1-1.5, 2.1, 2.2, 2.5, 3.1-3.4	• Interprets textual information obtained from a range of sources and determines how content may be applied to individuals and to organisational requirements
Writing	1.3, 1.4, 2.1, 2.2, 2.3, 2.5, 3.3, 3.4	• Uses information from a range of sources to develop and document plans, strategies and feedback in accordance with organisational requirements • Maintains records using correct technical and organisational vocabulary
Oral Communication	1.6, 2.4, 2.5, 3.2, 3.3	• Present information and opinions using language and features appropriate to the audience and context • Uses questioning and listening techniques to identify learning needs and obtain feedback
Navigate the world of work	1.5, 2.2, 2.3, 3.1, 3.4	• Recognises and responds to both explicit and implicit organisational procedures and protocols and legislative/regulatory requirements • Understands how own role meshes with others and contributes to broader goals
Interact with others	1.6, 2.1, 2.3 -2.5, 3.2, 3.3	• Selects the appropriate form, channel and mode of communication for a specific purpose relevant to own role • Collaborates with others to achieve joint outcomes, playing an active role in facilitating effective group interaction, influencing direction and taking a leadership role on occasion • Recognises the importance of building rapport to establish effective working relationships • Applies a range of communication strategies to encourage others to share their knowledge and skills and reflect on the effectiveness of the interaction
Get the work done	1.1, 1.2, 1.3, 1.4, 2.1, 2.5, 3.1, 3.4	• Uses logical processes to plan, implement and monitor learning in the workplace • Systematically gathers and analyses relevant

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		information and evaluates options to make informed decisions • Evaluates outcomes of decisions to identify opportunities for improvement • Uses digital tools to organise, store, integrate and share relevant information

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBLED501 Develop a workplace learning environment	BSBLED501A Develop a workplace learning 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 BSBLED501 Develop a workplace learning 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:

- collaboratively review performance development needs of individuals and teams
- plan professional development for individuals and teams that enhances organisational performance
- develop and implement learning plans
- liaise with training and development specialists
- recognise workplace achievement by giving feedback, recognition and rewards
- monitor and improve workplace learning
- record and report workplace learning outcomes.

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 management of relationships can achieve a learning environment
- identify principles and techniques involved in the management and organisation of:
  - adult learning
  - coaching and mentoring
  - consultation and communication
  - improvement strategies
  - leadership
  - learning environment and learning culture
  - monitoring and reviewing workplace learning
  - problem identification and resolution
  - record keeping and management methods

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- structured learning
- work-based learning.

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:

- workplace policies and procedures
- workplace equipment and resources
- case studies and, where available, 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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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

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 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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BSBMGT517 Manage 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 develop and monitor implementation of the operational plan to provide efficient and effective workplace practices within the organisation's productivity and profitability plans.

Management at a strategic level requires systems and procedures to be developed and implemented to facilitate the organisation's operational plan.

This unit applies to individuals who manage the work of others and operate within the parameters of a broader strategic and/or business plan.

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. Develop operational plan	1.1 Research, analyse and document resource requirements and develop an operational plan in consultation with relevant personnel, colleagues and specialist resource managers 1.2 Develop and/or implement consultation processes as an

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ELEMENT	PERFORMANCE CRITERIA
	integral part of the operational planning process 1.3 Ensure the operational plan includes key performance indicators to measure organisational performance 1.4 Develop and implement contingency plans for the operational plan 1.5 Ensure the development and presentation of proposals for resource requirements is supported by a variety of information sources and seek specialist advice as required 1.6 Obtain approval for the plan from relevant parties and explain the plan to relevant work teams
2. Plan and manage resource acquisition	2.1 Develop and implement strategies to ensure that employees are recruited and/or inducted within the organisation's human resources management policies, practices and procedures 2.2 Develop and implement strategies to ensure that physical resources and services are acquired in accordance with the organisation's policies, practices and procedures 2.3 Recognise and incorporate requirements for intellectual property rights and responsibilities in recruitment and acquisition of resources and services
3. Monitor and review operational performance	3.1 Develop, monitor and review performance systems and processes to assess progress in achieving profit and productivity plans and targets 3.2 Analyse and interpret budget and actual financial information to monitor and review profit and productivity performance 3.3 Identify areas of under-performance, recommend solutions and take prompt action to rectify the situation 3.4 Plan and implement systems to ensure that mentoring and coaching are provided to support individuals and teams to effectively, economically and safely use resources 3.5 Negotiate recommendations for variations to operational plans and gain approval from designated persons/groups 3.6 Develop and implement systems to ensure that procedures and records associated with documenting performance are managed in accordance with organisational requirements

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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	1.1, 1.5, 2.1, 2.2, 3.1, 3.2, 3.3, 3.4, 3.6	• Identifies and extracts relevant information from a range of complex texts • Gathers, interprets and analyses workplace documentation to determine requirements for the operational plan
Writing	1.1-1.5, 2.1, 2.2, 3.1-3.6	• Develops and documents a range of detailed texts relating to the management of an operational plan according to organisational requirements • Ensures the vocabulary, grammatical structures and conventions are appropriate for the context and target audience
Oral Communication	1.1, 1.2, 1.5, 1.6, 3.4, 3.5	• Presents information to a range of audiences using appropriate register, vocabulary and paralinguistic features • Listens and comprehends information from a variety of spoken exchanges with clients, co-workers and other stakeholders • Confirms understanding through questioning and active listening
Numeracy	1.1, 1.3, 1.4, 3.1-3.4	• Selects and uses mathematical problem-solving strategies to organise resource requirements, performance benchmarks and financial viability of the operational plan
Navigate the world of work	2.1, 2.2, 3.4, 3.6	• Monitors adherence to organisational policies, procedures and considers own role in terms of its contribution to broader goals of the work environment • Appreciates the implications of legal responsibilities with specific reference to health and safety
Interact with others	1.1, 1.2, 1.5, 1.6, 3.5	• 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, influencing direction and taking a leadership role on occasion
Get the work done	1.1-1.5, 2.1, 2.2, 3.1, 3.3, 3.4, 3.6	• Takes responsibility for developing and implementing systems and processes to achieve organisational objectives, seeking advice, feedback and support as

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		required to assist in the development and planning phase • Sequences and schedules complex activities, monitors implementation, and manages relevant communication • Uses systematic analytical processes to aid decision making, identify potential problems and generate contingency plans or solutions

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBMGT517 Manage operational plan	BSBMGT515A Manage operational plan	Updated to meet Standards for Training Packages. Edits to clarify intent of Performance Criteria. Additional performance criterion and evidence for intellectual property.	No 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 BSBMGT517 Manage 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:

- develop and implement an operational plan using a variety of information sources and consultation (including using specialist advice if required) which includes:
  - resource requirements
  - key performance indicators
  - monitoring processes
  - contingency plans
- communicate effectively with relevant stakeholders to explain the plan and supporting information, seek approvals, negotiate variations and engage work teams
- develop and implement strategies to achieve the operational plan within the organisation's policies, practices and procedures including:
  - recruiting, inducting and developing personnel
  - acquiring physical resources and services
  - protecting intellectual property
  - making variations to the plan
  - monitoring and documenting performance.

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 models and methods for operational plans
- explain the role of an operational plan in achieving the organisation's objectives
- explain budgeting processes

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- list alternative approaches to developing key performance indicators to meet business objectives
- outline the legislative and regulatory context relevant to the operational plan of the organisation
- outline the organisation's policies, practices and procedures that directly relate to the operational plan.

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 and regulations
- 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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BSBSUS501 Develop workplace policy and procedures for sustainability

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 develop and implement a workplace sustainability policy and to modify the policy to suit changed circumstances.

It applies to individuals with managerial responsibilities who undertake work developing approaches to create, monitor and improve strategies and policies within workplaces and engage with a range of relevant stakeholders and specialists.

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

Unit Sector

Industry Capability – Sustainability

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. Develop workplace sustainability policy	1.1 Define scope of sustainability policy 1.2 Gather information from a range of sources to plan and develop policy 1.3 Identify and consult stakeholders as a key component of the policy development process 1.4 Include appropriate strategies in policy at all stages of work for

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ELEMENT	PERFORMANCE CRITERIA
	minimising resource use, reducing toxic material and hazardous chemical use and employing life cycle management approaches 1.5 Make recommendations for policy options based on likely effectiveness, timeframes and cost 1.6 Develop policy that reflects the organisation's commitment to sustainability as an integral part of business planning and as a business opportunity 1.7 Agree to appropriate methods of implementation, outcomes and performance indicators
2. Communicate workplace sustainability policy	2.1 Promote workplace sustainability policy, including its expected outcome, to key stakeholders 2.2 Inform those involved in implementing the policy about expected outcomes, activities to be undertaken and assigned responsibilities
3. Implement workplace sustainability policy	3.1 Develop and communicate procedures to help implement workplace sustainability policy 3.2 Implement strategies for continuous improvement in resource efficiency 3.3 Establish and assign responsibility for recording systems to track continuous improvements in sustainability approaches
4. Review workplace sustainability policy implementation	4.1 Document outcomes and provide feedback to key personnel and stakeholders 4.2 Investigate successes or otherwise of policy 4.3 Monitor records to identify trends that may require remedial action and use to promote continuous improvement of performance 4.4 Modify policy and or procedures as required to ensure improvements are made

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, 1.2, 4.2, 4.3	• Identifies, analyses and evaluates complex textual information to determine legislative and regulatory requirements, trends and outcomes
Writing	1.2-1.7, 2.1, 2.2, 3.1, 3.3, 4.1, 4.3, 4.4	• Researches, plans and prepares documentation using format and language appropriate to context, organisational requirements and audience
Oral Communication	1.2, 1.3, 2.1, 2.2, 3.1, 4.1	• Presents information and seeks advice using language appropriate to audience • Participates in discussions using listening and questioning to elicit the views of others and to clarify or confirm understanding
Numeracy	1.5, 4.3	• Interprets and uses mathematical equations to calculate numerical information relating to time durations and costs
Navigate the world of work	1.1-1.6, 3.1, 4.4	• Develops, monitors and modifies organisational policies and procedures in accordance with legislative requirements and organisation goals
Interact with others	1.2, 1.3, 2.1, 2.2, 3.1, 3.3, 4.1, 4.3	• Selects and uses appropriate conventions and protocols when communicating with internal and external stakeholders to seek or share information • Plays a lead role in consulting and negotiating positive outcomes with a range of stakeholders
Get the work done	1.2, 1.4-1.7, 2.3, 2.4, 3.1, 3.2, 3.3, 3.5, 3.6, 4.1, 4.3, 4.4	• Plans, organises and implements work activities of self and others that ensure compliance with organisational policies and procedures, and legislative requirements • Sequences and schedules complex activities, monitors implementation, and manages relevant communication • Uses systematic, analytical processes in relatively complex, situations, setting goals, gathering relevant information, and identifying and evaluating options against agreed criteria • Evaluates outcomes of decisions to identify opportunities for improvement

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBSUS501 Develop workplace policy and	BSBSUS501A Develop workplace policy and procedures	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
procedures for sustainability	for sustainability	Minor edits to clarify 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 BSBSUS501 Develop workplace policy and procedures for sustainability

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:

- scope and develop organisational policies and procedures that comply with legislative requirements and support the organisation's sustainability goals covering at a minimum:
  - minimising resource use
  - resource efficiency
  - reducing toxic material and hazardous chemical use
  - employing life cycle management approaches
  - continuous improvement
- plan and implement sustainability policy and procedures including:
  - agreed outcomes
  - performance indicators
  - activities to be undertaken
  - assigned responsibilities
  - record keeping, review and improvement processes
- consult and communicate with relevant stakeholders to generate engagement with sustainability policy development, implementation and continuous improvement
- review and improve sustainability policies.

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 environmental or sustainability legislation, regulations and codes of practice applicable to the organisation identify internal and external sources of information and explain how they can be used to plan and develop the organisation's sustainability policy

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- explain policy development processes and practices
- outline organisational systems and procedures that relate to sustainability
- outline typical barriers to implementing policies and procedures in an organisation and possible strategies to address them.

Assessment Conditions

Assessment must be conducted in a safe environment where evidence gathered demonstrates consistent performance of typical activities experienced in the sustainability 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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BSBWOR501 Manage personal work priorities and professional development

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 systems and process to organise information and prioritise tasks.

It applies to individuals working in managerial positions who have excellent organisational skills. The work ethic of individuals in this role has a significant impact on the work culture and patterns of behaviour of others as managers at this level are role models in their work environment.

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 personal work goals	1.1 Serve as a positive role model in the workplace through personal work planning 1.2 Ensure personal work goals, plans and activities reflect the organisation's plans, and own responsibilities and accountabilities 1.3 Measure and maintain personal performance in varying work conditions, work contexts and when contingencies occur

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ELEMENT	PERFORMANCE CRITERIA
2. Set and meet own work priorities	2.1 Take initiative to prioritise and facilitate competing demands to achieve personal, team and organisational goals and objectives 2.2 Use technology efficiently and effectively to manage work priorities and commitments 2.3 Maintain appropriate work-life balance, and ensure stress is effectively managed and health is attended to
3. Develop and maintain professional competence	3.1 Assess personal knowledge and skills against competency standards to determine development needs, priorities and plans 3.2 Seek feedback from employees, clients and colleagues and use this feedback to identify and develop ways to improve competence 3.3 Identify, evaluate, select and use development opportunities suitable to personal learning style/s to develop competence 3.4 Participate in networks to enhance personal knowledge, skills and work relationships 3.5 Identify and develop new skills to achieve and maintain a competitive edge

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, 3.5	• Investigates and uses a range of strategies to develop personal competence
Reading	1.2, 3.1, 3.2	• Analyses and interprets textual information from organisational policies and practices or feedback to inform personal development planning
Writing	3.2	• Uses feedback to prepare reports that summarise ways to improve competence
Oral Communication	3.2	• Uses active listening and questioning to seek and receive feedback
Navigate the world of work	1.2, 2.1	• Understands how own role contributes to broader organisational goals • Considers organisational protocols when planning own career development

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Interact with others	1.1, 3.2, 3.4	• Selects and uses appropriate conventions and protocols when communicating with diverse stakeholders • Uses interpersonal skills to establish and build positive working relationships with others
Get the work done	1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 3.1	• Plans and prioritises tasks in order to meet deadlines, manage role responsibilities and to manage own personal welfare • Identifies and uses appropriate technology to improve work efficiency

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
BSBWOR501 Manage personal work priorities and professional development	BSBWOR501B Manage personal work priorities and professional development	Updated to meet Standards for Training Packages Minor edits to clarify 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 BSBWOR501 Manage personal work priorities and professional development

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 business technology to create and use systems and processes to organise and prioritise tasks and commitments
- measure and maintain personal work performance including assessing competency against competency standards and seeking feedback
- maintain an appropriate work-life balance to manage personal health and stress
- participate in networks
- develop a personal development plan which includes career objectives and an action plan
- develop new skills.

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 involved in the management and organisation of:
  - performance measurement
  - personal behaviour, self-awareness and personality traits identification
  - a personal development plan
  - personal goal setting
  - time
- discuss management development opportunities and options for self
- describe methods for achieving a healthy work-life balance
- outline organisation’s policies, plans and procedures
- explain types of learning style/s and how they relate to the individual
- describe types of work methods and practices that can improve personal 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 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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CPCCCM2007 Use explosive power tools

Modification History

Release 1.

Supersedes and equivalent to CPCCCM2007B Use explosive power tools.

The unit of competency was updated to the Standards for Training Packages 2012.

This version first released with CPC Construction, Plumbing and Services Training Package Version 4.0.

Application

This unit of competency specifies the skills and knowledge required to safely and effectively operate explosive power tools (EPTs) using explosive charges in a magazine to fasten materials or fix fasteners to bases.

The unit supports the application of knowledge to safely and effectively use a range of indirect action explosive powered fastening tools used in the construction industry.

It applies to workers who work with EPTs in the construction industry. It involves working under supervision in a team environment.

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

Pre-requisite Unit

CPCCWHS2001 Apply WHS requirements, policies and procedures in the construction industry.

Unit Sector

Construction

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe what needs to be done to demonstrate achievement of the element.
1. Plan and prepare to set up, operate and maintain indirect action EPTs.	1.1 Review and clarify task to set up, operate and maintain indirect action EPTs. 1.2 Review work health and safety (WHS) requirements for the

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	task in accordance with safety plans and policies. 1.3 Identify safety signage and barricade requirements. 1.4 Review environmental requirements for the task in accordance with environmental plans and legislative requirements. 1.5 Calculate material quantity requirements. 1.6 Check EPTs for operation in accordance with manufacturers' specifications and safety requirements for use of EPT.
2. Set out fasteners.	2.1 Erect identified safety signage and barricades, and fit personal protective equipment (PPE). 2.2 Select fastener in accordance with requirements of the job. 2.3 Set-out fasteners adhering to minimum distances for set out from edge of substrate material in accordance with requirements. 2.4 Position material, check it is level, and temporarily fix or clamp into designed position in accordance with detailed drawings.
3. Operate EPTs.	3.1 Select charge in accordance with the requirements for material, base and penetration. 3.2 Install any attachments and accessories to EPT in accordance with manufacturers' specifications and WHS requirements. 3.3 Load fastener and charge into EPT in accordance with manufacturers' specification. 3.4 Carry out EPT operation and fix fastener into place in accordance with manufacturers' specifications and legislative requirements. 3.5 Check depth of fastening penetration and adjust power regulating device in accordance with conditions. 3.6 Carry out misfire procedures in accordance with manufacturers' specifications and legislative requirements. 3.7 Remove temporary holdings and fixings without damage to material.
4. Maintain EPTs and kit.	4.1 Check safety features of tools for serviceability in accordance with manufacturers' specifications. 4.2 Clean and lubricate tools in accordance with manufacturers' specifications. 4.3 Carry out periodic maintenance service in accordance with manufacturers' specifications. 4.4 Replenish diminished stocks of charges and fasteners to designed effectiveness of EPT kit. 4.5 Check and complete logbook and record maintenance in

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	accordance with manufacturers' specifications.
5. Secure and store EPT equipment and charges.	5.1 Store used charges in designated container in accordance with requirements. 5.2 Store unused fasteners, the EPT and attachments in a carry case in line with manufacturers' specifications.
6. Clean up after operating EPTs.	6.1 Clear work area and dispose of, re-use or recycle materials in accordance with legislation, regulations, codes of practice and task requirements. 6.2 Clean, check, maintain and store tools and equipment in accordance with manufacturers' specifications and workplace requirements.

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.

- reading skills to:
  - interpret legislative requirements including those of Australian Standards and the National Construction Code (NCC)
- numeracy skills to:
  - apply measurements and calculations to fastener set-out
- oral communication skills to:
  - use questioning to identify and confirm requirements
  - discuss cause of problems
  - report work site hazards, including faults in tools, equipment and materials.

Unit Mapping Information

Supersedes and is equivalent to CPCCCM2007B Use explosive power tools.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

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Assessment Requirements for CPCCCM2007 Use explosive power tools

Modification History

Release 1.

Supersedes and equivalent to CPCCCM2007B Use explosive power tools.

The unit of competency was updated to the Standards for Training Packages 2012.

This version first released with CPC Construction, Plumbing and Services Training Package Version 4.0.

Performance Evidence

To demonstrate competency in this unit, a person must use explosive power tools (EPTs) to fix metal and timber to one steel base, one concrete base, and one masonry base.

In doing this, the person must meet the performance criteria for this unit.

Knowledge Evidence

To be competent in this unit, a person must demonstrate knowledge of:

- jurisdictional legislation and regulations relating to setting up, operating and maintaining indirect action EPTs including those for work health and safety (WHS), and protection of the environment, including:
  - job safety analyses (JSAs)
  - safe work method statements (SWMSs)
  - safety data sheets (SDSs)
  - safety manuals and instructions for plant, tools and equipment
  - signage and barricades
  - personal protective equipment (PPE)
  - environmental and work site safety plans
- requirements of Australian Standards and the National Construction Code (NCC) relating to setting up, operating and maintaining indirect action EPTs
- functions, operations and limitations of EPTs
- EPT materials
- EPT charges and fasteners
- EPT attachments, including channel, rebate and other manufacturer attachments
- EPT, fastener and charge manufacturers' specifications
- processes for interpreting drawings and using information for:
  - setting-out fasteners, including:
    - regulated minimum distances

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        - bases, including concrete, masonry or steel
    - positioning material
- processes for:
    - using EPTs, including:
        - stripping and assembling tools
        - completing log of serviceability
        - maintaining and cleaning tools
        - selecting charges and fasteners applicable to the base material and material being fixed
        - misfire procedures
        - using attachments
        - complying with storage and security regulations and work health and safety (WHS) requirements for the working environment
        - selecting signage
        - test fire
    - maintaining EPTs and kits
    - securing and storing EPT equipment and charges
- materials storage and environmentally friendly waste management
- processes for the calculation of material requirements
- security and storage procedures for equipment and charges
- workplace and equipment safety requirements.

Assessment Conditions

Assessors must satisfy the requirements for assessors contained in the Standards for Registered Training Organisations.

Assessment of performance must be undertaken in the workplace or in a simulated workplace environment. Tasks are to be performed to the level of proficiency and within the time limits expected in a workplace.

Assessors are responsible for ensuring that the person demonstrating competency has access to:

- industry-standard indirect action EPTs, attachments, fasteners and charges
- specifications for tasks requiring use of EPTs
- appropriate documents, materials, tools equipment and PPE currently used in industry
- requirements of appropriate sections of legislation and regulations
- relevant workplace policies and procedures.

Links

Companion volumes to this training package are available at the VETNet website - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad

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CPCCLDG3001A Licence to perform dogging

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to perform slinging techniques, including the selection and inspection of lifting gear and/or the directing of the crane operator in the movement of the load when the load is out of view of the crane/ operator for licensing purposes.

Application of the Unit

Application of the unit

This unit covers the scope of work to demonstrate competency in the application of slinging techniques, selection and inspection of lifting gear and/or the directing of the crane/ operator in the movement of the load.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

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Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	1.1. ***Site information*** is obtained and related to the task. 1.2. ***Hazard*** s and potential hazards associated with the slinging and directing of loads are identified. 1.3. ***Hazard control measures*** consistent with ***appropriate standards*** are identified to ensure the safety of personnel and equipment. 1.4. The weight, dimensions and centre of gravity of the load are identified and assessed. 1.5. Suitable lifting/slinging points on the load are identified. 1.6. Appropriate ***lifting equipment*** needs are assessed. 1.7. Appropriate ***communication methods*** are assessed with ***crane***/ operators and other ***appropriate personnel***. 1.8. Manufacturer's specifications/information is obtained for special loads where necessary.
2. Select and inspect equipment.	2.1. Lifting equipment appropriate to the task is selected. 2.2. Lifting equipment is inspected for serviceability. 2.3. Damaged or excessively worn lifting equipment is identified, labelled and rejected.

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ELEMENT	PERFORMANCE CRITERIA
	2.4. Appropriate communication methods for the crane/operator and appropriate personnel are selected.
	2.5. Appropriate ***communication equipment*** is selected and its serviceability is checked.
	2.6. Appropriate ***personal protective equipment*** (PPE) is selected and checked.
3. Prepare site and equipment.	3.1. Hazard prevention/control measures are applied consistent with appropriate standards to ensure the safety of personnel and equipment.
	3.2. Appropriate slinging method is selected.
	3.3. Lifting equipment is prepared and assembled where appropriate.
	3.4. Load destination is prepared.
4. Perform task.	4.1. Lifting equipment is attached and secured to the lifting hook using appropriate techniques.
	4.2. Lifting hook is positioned over the load centre of gravity.
	4.3. Lifting equipment is attached and secured to the load in an appropriate manner.
	4.4. Tag line is attached and secured where appropriate.
	4.5. Test lift is conducted to ensure security of load.
	4.6. Load is moved maintaining stability and control at all times.
	4.7. Appropriate communication methods and ***communication signals*** are applied to safely coordinate the load movement both within sight and out-of-sight of crane operator.
	4.8. The load is landed to ensure that it is stable and secure from movement.
	4.9. Lifting equipment is removed or disconnected from load and prepared for next task or storage.
5. Shut down job and clean up.	5.1. Unserviceable lifting equipment inspected and rejected.
	5.2. ***Defective equipment*** is isolated and tagged.
	5.3. Lifting equipment is stored in accordance with procedures and appropriate standards.
	5.4. Hazard prevention/control measures are removed where appropriate.
	5.5. Excess materials from the work area are removed (where applicable).

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ELEMENT	PERFORMANCE CRITERIA
	5.6. Defects are reported and recorded according to procedures and appropriate action is taken.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- communication techniques in the workplace including whistles, hand signals and use of fixed channel two-way radios
- communication skills at a level sufficient to communicate with other site personnel
- calculate rated capacity of lifting equipment
- apply different methods for making temporary connections to loads using fibre and synthetic ropes
- ability to interpret rated capacity and working load limit tags
- hazard identification and control
- slinging techniques
- selection and inspection of lifting equipment
- directing crane operators in the moving of loads in a safe manner, using a slewing crane
- inspection and care of a wide range of lifting equipment to appropriate Australian Standards and/or manufacturer's specifications.

Required knowledge

Required knowledge for this unit is:

- appropriate mathematical procedures for estimation and measurement of loads
- basic knowledge of types of cranes and their functions
- Commonwealth, state or territory OHS legislation, standards and codes of practice relevant to the full range of techniques for undertaking dogging activities
- load stability and safety factors in line with manufacturer's specifications
- types of lifting equipment and slinging techniques for use, and their limitations and performance in a wide range of conditions (including but not limited to slings, beams, accessories, clamps, work-boxes, bins and pallets)
- understanding of the hierarchy of control.

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Evidence Guide

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

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment of this unit which have been endorsed by the national body responsible for OHS matters.

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 ability to:

- comply with Commonwealth, state or territory OHS legislation, standards relevant to safe dogging and crane operations.
- communicate and work safely with others in the work area.
- apply Hazard prevention and control measures consistent with appropriate standards.
- apply to move loads in conjunction with cranes including, the reading of tags, slinging, loading, directing and landing loads with a slewing mobile crane with a telescopic boom and a winch, in and out of sight of the crane/ operator, moving four loads of varying shapes, sizes and weights.
- use fibre and/or synthetic rope as tag lines, and connecting to loads using clove hitch, rolling hitch, bowline and single sheetbend.
- conduct pre and post operational checks of the lifting equipment.

Context of and specific resources for assessment

- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the national OHS endorsed Assessment Instrument
- Assessment of performance must be

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EVIDENCE GUIDE

	undertaken either in the workplace or in a realistically simulated workplace setting
	• Assessors must ensure that the assessment in the workplace is organised through a workplace supervisor to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace
	• Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints
	• Assessment is to comply with the requirements of any relevant Standards or operating procedures for dogging activities
	• Applicants must have access to:
	  • personal protective equipment (PPE) for the purpose of the performance assessment.
	  • four different loads as prescribed in the endorsed assessment instrument
	  • lifting and associated equipment
	  • suitable slewing crane
	  • communication equipment (eg. fixed channel, two-way radios) as applicable.

Method of assessment	Assessment must be conducted using the national OHS endorsed Assessment Instrument. This Instrument provides instruction on the application of the assessment. Assessment may be in conjunction with the assessment of other units of competency. The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

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Range Statement

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.

Site informationmay include but not be limited to	• local conditions such as access and egress • work method statements.
Hazards may include but not limited to:	• ground stability (eg. ground condition, recently filled trenches, slopes) • overhead hazards (e.g. power lines, service pipes, trees, buildings, etc) • insufficient lighting • traffic (e.g. pedestrians, vehicles, plant) • weather (e.g. wind, lightning, storms) • other specific hazards (e.g. trip hazards, heights, radio interference, etc).
Hazard prevention/control measures	The systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes the application of the hierarchy of controls, including: 1. elimination. 2. substitution. 3. isolation. 4. engineered control measures. 5. safe work practices. 6. personal protective equipment.
Appropriate standard s may include:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards.

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RANGE STATEMENT

Lifting Equipment may include but not limited to:	• fibre ropes • wire ropes • chain • wire and synthetic slings • shackles • eyebolts • beam clamps • plate clamps • spreader beams • lifting beams • pallet forks and cages • concrete kibbles • personnel boxes.
Communication Methods may include but are not limited to:	• written instructions • signage, • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol.
Cranes may include but not limited to:	• tower cranes (including self erecting) • portal boom cranes • vehicle loading cranes • slewing mobile cranes • non-slewing cranes • derrick cranes.
Appropriate personnel may include but are not limited to:	• supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations.
Communication Equipment may include but not limited to:	• fixed channel two-way radios • whistles • bells.
Personal protective equipment (PPE) may include but not limited to:	• hard hat • safety boots • gloves • high visibility clothing • reflective vest • relevant breathing, hearing, sight, skin and sun protection.
Load destination may include but	• ground

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RANGE STATEMENT

not limited to:	• loading platforms • suspended floors • vehicles.
Communication signals may include but not limited to:	• stop - hand • stop - whistle • hoist up - hand • hoist up - whistle • hoist down - hand • hoist down - whistle • luff boom down - hand • luff boom down - whistle • luff boom up - hand • luff boom up - whistle • telescope out - hand • telescope out - whistle • telescope in - hand • telescope in - whistle • slew left - hand • slew left - whistle • slew right - hand • slew right - whistle.
Defective Equipment may include but not limited to:	• excessive wear • damage • stretched • broken wires • cut/damaged fibres.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

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Co-requisite units Nil

Functional area

Functional area

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CPCCLHS3001A Licence to operate a personnel and materials hoist

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit specifies the outcomes required to operate a builder's hoist in which personnel, goods and/or materials may be hoisted, and which comprises a car, structure, machinery or other equipment associated with the hoist, and which may be a cantilever hoist, a tower hoist or a multiple winch operation. Included in this definition are situations where winches may be configured to operate as hoists for the transportation of personnel for licensing purposes.

Application of the Unit

Application of the unit

This unit requires the operator to plan work, conduct routine checks, conduct hoist operations and shut down and secure a hoist.

This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit, which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

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Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Plan work.	1.1. Potential workplace ***hazards*** are identified. 1.2. ***Hazard prevention***/***control measures*** are identified consistent with ***appropriate standards*** to ensure the safety of personnel and equipment. 1.3. The ***hoist*** is appropriate to the load/s and workplace conditions. 1.4. The weight of the load is determined according to ***procedures***. 1.5. Appropriate communication methods are identified with appropriate personnel.
2. Conduct routine checks.	2.1. Hoist is visually checked for any damage or detects. 2.2. Appropriate hazard prevention/control measures are applied to the work area according to procedures and potential hazards.

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ELEMENT	PERFORMANCE CRITERIA
	2.3. ***Service logbook*** for the hoist is checked for compliance.
	2.4. ***Routine pre-start operational checks*** are carried out according to procedures.
	2.5. Main power supply is switched on.
	2.6. Hoist is started according to procedures and checks made for any abnormal noises.
	2.7. All controls located and checked for serviceability.
	2.8. Post start operational checks are carried out according to procedures.
	2.9. All ***communication equipment***, lighting and alarm systems are checked for serviceability.
	2.10. All hoist ***safety devices*** are tested to their maximum according to procedures.
	2.11. All damage and defects are reported and recorded according to procedures and appropriate action taken.
3. Conduct hoist operations.	3.1. Hoist is operated according to procedures.
	3.2. Communication methods associated with hoist movements are conducted according to procedures and the appropriate standards.
	3.3. Loads and load distribution are continually monitored to ensure that the hoist is operated within its capacity according to procedures.
	3.4. Hoist movement is monitored constantly ensuring safety to appropriate personnel and hoist stability.
	3.5. ***Unplanned and/or unsafe situations*** are responded to in line with procedures.
4. Shut down and secure hoist.	4.1. Hoist is ***shut down*** according to procedures.
	4.2. All fences and gates are secured according to procedures.
	4.3. Routine post -operational checks are carried out according to procedures.
	4.4. Power is isolated and secured against unauthorised access.
	4.5. All damage and defects are reported and recorded according to procedures and appropriate action taken.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- accurately record and maintain information relating to personnel and materials hoist operations
- communication techniques in the workplace including bells, lights, intercom and use of two-way radios
- conduct personnel and materials hoist operations
- operate emergency brake and decent system
- hazards associated with the operation of the personnel and materials hoist are identified, risks are assessed and effective hazard prevention/control measures for those hazards identified and put into place
- inspect personnel and materials hoist equipment, safety equipment and installation for safe operation including general maintenance
- communication skills at a level sufficient to communicate with other site personnel (e.g. receive and interpret work instructions, safety information, emergency procedures)
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- weight of the load is determined from labels, markings or load paperwork
- level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Commonwealth, state or territory OHS legislation, standards and codes of practice relevant to the full range of processes for the hoist class
- hoist operations and operating techniques
- understanding of the hierarchy of hazard identification and control
- materials safety data sheets and requirements for safe movement of materials
- organisational and workplace standards, requirements, policies and procedures for conducting operations for the hoist class
- procedures for the recording, reporting and maintenance of workplace records and information
- rated capacity and working load limits
- typical routine problems encountered in the operation of a personnel and materials hoist, inspection techniques and adjustments required for correction.

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Evidence Guide

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

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OHS matters.

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 ability to:

- comply with OHS licensing legislation
- effectively communicate and work safely with others in the work area
- identify hazards associated with the operation of the hoist and put in place effective hazard controls for those hazards identified
- determine load weights
- effectively conduct personnel and materials hoist operations to include the tasks of raising and lowering loads with hoist; in conjunction with awareness of the limitations of the hoist according to manufacturer's specifications
- ensure hoist controls are attended throughout operation.
- effectively conduct emergency lowering of the hoist according to the emergency lowering procedure
- effectively conduct pre operational and shut down checks of the personnel and materials hoist (particular awareness of controls, alarms and lockout devices).

Context of and specific resources for assessment

- Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument

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	• Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace
	• Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace
	• Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints
	• Assessment is to comply with relevant appropriate standard requirements
	• Applicants must have access to:
	  • personal protective equipment (PPE) for the purpose of the Performance Assessment.
	  • appropriate personnel and material hoist and associated equipment in safe condition
	  • suitable loads as specified by the endorsed assessment instrument
	  • communication equipment (e.g. two-way radios, intercoms, light systems, buzzers, bells etc)

Method of assessment	Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application. The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**. Assessment may be in conjunction with the assessment of other units of competency. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

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Range Statement

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.

Hazards may include but are not limited to:	• ground conditions (e.g. condition of pavement, slopes) • overhead hazards (e.g. power lines, service pipes) • traffic (e.g. pedestrians, vehicles, other plant) • environmental conditions (e.g. wind, lightning, rain) • hoist overload • other specific hazards (e.g. dangerous materials).
Hazard prevention/control measures may include:	Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes application of the hierarchy of control, the six step preference of control measures to manage and control risk: • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment
Appropriate standards may include:	• codes of practice • legislation • Australian standards • manufacturer specifications.
Hoist includes:	• the operation of a builder's hoist in which personnel, goods and/or materials may be hoisted, and which comprises a car, structure, machinery or other equipment associated with the hoist, and which may be a cantilever hoist, a tower hoist or a multiple winch operation.

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RANGE STATEMENT

	Included in this definition are situations where winches may be configured to operate as hoists for the transportation of personnel.
Procedures may include but not limited to:	• manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures • workplace procedures (work instructions, operating procedures, checklists).
Communication methods may include but not limited to:	• verbal and non-verbal language • written instructions • signage • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol • interfloor/level communications
Appropriate personnel may include but not limited to:	• those associated with the operations of the personnel and materials hoist • supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations.
Service logbook may include but is not limited to:	• any logbook • service book • history record system where the service and maintenance history is kept.
Routine pre start operational checks may include but not limited to:	• ground stability • tower ties/guys are secure • power supply is covered by earth leakage protection • power leads secured above ground level and not attached to scaffolds or building structure • tower guides are clean and free of rust and damage • signs are clearly displayed and legible • brakes and drive mechanism • overhead protection • intercom and signalling systems • barriers, fencing and gates • fuels, oil and water • lubrication (grease)

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RANGE STATEMENT

	• hoist rope • sheaves and anchorage points.
Communication equipment may include but not limited to:	• fix frequency two-way radios • bells • buzzers • lights. **NB**: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the hoist.
Safety devices may include but not limited to:	• emergency braking system • overrun limits • gate interlocks • personnel access interlock on hoist roof.
Appropriate standards may include but are not limited to:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
Unplanned and/or unsafe situations may include but not limited to:	• failure/loss of control e.g. power supply, braking system • failure of equipment e.g. hydraulic system, broken hoist cable, damaged gear drive • environmental conditions e.g. wind, lightning, storms.
Shut down may include but not limited to:	• platform positioned at base of tower • lock on manual safety brake • landing gates secured to prevent unauthorised access • power isolated from control panel • mains power supply isolated and secured • internal combustion engine idled to stabilise temperature • engine turned off • fencing/barriers around base secured to prevent unauthorised access • key removed (where applicable).

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Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

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CPCCLHS3002A Licence to operate a materials hoist

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to operate a materials hoist being a builder's hoist by which only goods or materials and not personnel may be hoisted and where the car, bucket or platform is cantilevered from, and travels up and down externally to, a face of the support structure for licensing purposes.

Application of the Unit

Application of the unit

This unit requires the operator to plan work, conduct routine checks, check controls and operation, conduct hoist operation and shut down and secure hoist.

This unit is based on the requirements of the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

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Prerequisite units Nil

Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Plan work.	1.1. Potential workplace ***hazards*** are identified. 1.2. ***Hazard control measures*** are identified consistent with ***appropriate standards*** to ensure the safety of personnel and equipment. 1.3. The ***hoist*** is appropriate to the load/s and workplace conditions. 1.4. The weight of the load is determined according to ***procedures***. 1.5. Appropriate communication methods are identified with appropriate personnel.
2. Conduct routine checks.	2.1. Hoist is visually checked for any damage or detects 2.2. Appropriate ***hazard prevention***/***control measures*** are applied to the work area according to ***procedures***. 2.3. ***Service logbook*** for the hoist is checked for compliance

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ELEMENT	PERFORMANCE CRITERIA
	2.4. ***Routine pre-start operational checks*** are carried out according to procedures. 2.5. Main power supply is switched on. 2.6. Hoist is started according to procedures and checked for any abnormal noises. 2.7. All controls located and checked for serviceability. 2.8. Post start operational checks are carried out according to procedures. 2.9. All ***communication equipment***, lighting and alarm systems are checked for serviceability. 2.10. All hoist ***safety devices*** and functions are tested to their maximum according to procedures. 2.11. All damage and defects are reported and recorded according to procedures and appropriate action taken.
3. Conduct hoist operations.	3.1. Hoist is operated according to procedures. 3.2. Communication methods associated with hoist movement are conducted according to procedures and the appropriate standard. 3.3. Loads and Load distribution are continually monitored to ensure that the hoist is operated within its capacity and according to procedures. 3.4. Hoist movement is monitored constantly ensuring safety to personnel and stability. 3.5. ***Unplanned and/or unsafe*** situations are responded to in line with procedures.
4. Shut down and secure hoist.	4.1. Hoist is ***shut down***, according to procedures. 4.2. All fences and gates are secured according to procedures. 4.3. Routine post -operational checks are carried out according to procedures. 4.4. Power is isolated and secured against unauthorised access. 4.5. All damage and defects are reported and recorded. according to procedures and appropriate action taken.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- accurately record and maintain information relating to materials hoist operations
- communication techniques in the workplace including bells, lights, hand signals intercom and use of two-way radios
- conduct materials hoist operations
- hazards associated with the operation of the materials hoist are identified, risks are assessed and effective hazard prevention/control measures for those hazards identified and put into place
- inspect materials hoist equipment, safety equipment and installation for safe operation
- interpersonal communication skills at a level sufficient to communicate with other site personnel (e.g. receive and interpret work instructions, safety information, emergency procedures)
- verify problems and equipment faults and demonstrate appropriate response procedures.

Required knowledge

Required knowledge for this unit is:

- weight of the load is determined from labels, markings or load paperwork
- level of literacy to be able to read and comprehend manufacturer's instructions, procedures and safety signs
- Commonwealth, state or territory OHS legislation, standards and codes of practice relevant to the full range of processes for the hoist class
- hoist operations and operating techniques
- understanding of the hierarchy of hazard identification and control
- materials safety data sheets and requirements for safe movement of materials
- organisational and workplace standards, requirements, policies and procedures for conducting operations for the hoist class
- procedures for the recording, reporting and maintenance of workplace records and information
- rated capacity and working load limits
- typical routine problems encountered in the operation of a materials hoist, inspection techniques and adjustments required for correction.

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Evidence Guide

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	Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work. State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OHS matters.
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 ability to: • comply with OHS licensing legislation. • effectively communicate and work safely with others in the work area. • identify hazards associated with the operation of the hoist and put in place effective hazard prevention/controls • determine load weights. • effectively conduct materials hoist operations to include the tasks of raising and lowering loads with equipment and materials for cantilevered cars, buckets or platforms. • ensure the hoist is attended at all times. • effectively conduct pre operational and shut down checks of the materials hoist (particular awareness of controls, alarms and lockout devices).
Context of and specific resources for assessment	• Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instrument • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting • Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a

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EVIDENCE GUIDE

	suitable working area is made available to suit the assessment and the workplace
	• Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints
	• Assessment is to comply with relevant appropriate standard requirements
	• Applicants must have access to:
	  • personal protective equipment (PPE) for the purpose of the Performance Assessment.
	  • appropriate material hoist and equipment in safe condition
	  • suitable loads as specified by the endorsed assessment instrument
	  • communication equipment (e.g. two-way radios, intercoms, light systems buzzers or bells etc)

Method of assessment	Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application. The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**. Assessment may be in conjunction with the assessment of other units of competency. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

Range Statement

RANGE STATEMENT

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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.

Hazards may include but not limited to:	• ground conditions (e.g. condition of pavement, slopes) • overhead hazards (e.g. power lines, service pipes) • Insufficient lighting • traffic (e.g. pedestrians, vehicles, other plant) • environmental conditions (e.g. wind, lightning, rain) • hoist overload • other specific hazards (e.g. dangerous materials).
Hazard control measures:	Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk: • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment.
Appropriate standards may include but not limited to:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standard (where applicable).
Hoist may include:	the operation of builder's hoist by which only goods or materials and not personnel may be hoisted and where the car, bucket or platform is cantilevered from, and travels up and down externally to, a face of the support structure.
Procedures may include but are	• manufacturer's guidelines (instructions,

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RANGE STATEMENT

not limited to:	specifications or checklists) • industry operating procedures • workplace procedures (work instructions, operating procedures, checklists).
Communication methods may include but are not limited to:	• verbal and non-verbal language • written instructions • signage • hand signals • listening • questioning to confirm understanding • appropriate worksite protocol • interfloor/ level communications.
Appropriate personnel may include but are not limited to:	• those associated with the operations of the hoist • supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations.
Hazard prevention/control measures may include but not limited to:	• safety tags on electrical switches/isolators • traffic barricades and control • pedestrian barricades • movement of obstructions • personal protective equipment • hoist safety gates and guards • hoist safety interlocks • adequate illumination.
Service logbook may include but is not limited to:	• any logbook • service book • history record system where the service and maintenance history is kept.
Routine pre start operational checks may include but are not limited to:	• check ground stability • tower ties/guys are secure • power supply is covered by earth leakage protection • power leads are secured above ground level and not attached to scaffolds or building structure • tower guides are clean and free of rust and damage • signage is clearly displayed and legible • brakes and drive mechanism

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RANGE STATEMENT

	• overhead protection • intercom and signalling systems • barriers, fencing and gates • fuels, oil and water (where applicable) • lubrication (grease) • hoist rope • sheaves and anchorage points.
Communication equipment may include but is not limited to:	• fixed channel two-way radios • intercoms • bells • lights • buzzers. **NB**: where radio communication equipment is used the transmitting frequencies of the equipment must be selected to prevent interference to or from other radio equipment being used in the vicinity of the hoist.
Safety devices may include but not limited to:	• emergency braking system • overrun limits • gate interlocks.
Unplanned and/or unsafe situations may include but are not limited to:	• failure/lose of control e.g. power supply, braking system • failure of equipment e.g. hydraulic system, broken hoist cable, damaged drive gear • environmental conditions (e.g. wind, lightning, storms, etc).
Shut Down may include but not limited to:	• position platform at base of tower • power isolated from control panel • mains power supply isolated and secured • fencing/barriers around base secured to prevent unauthorised access • landing gates secured to prevent unauthorised access • key removed from control panel (where applicable).

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Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

Functional area

Functional area

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CPCCLRG3001A Licence to perform rigging basic level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit specifies the outcomes required to perform basic rigging work associated with movement of plant and equipment, steel erections, hoists (including mast climbing hoists), placement of pre-cast concrete, safety nets and static lines, perimeter safety screens and shutters; and cantilever crane loading platforms for licensing purposes.

Application of the Unit

Application of the unit

This unit requires the applicant to be able plan the work, select and inspect equipment, set up task, erect structures and plant and dismantle structures and plant.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

This unit has a pre-requisite requirement. This requirement may be met by either the successful completion of the unit *CPCCLDG3001A Licence to perform dogging* or holding a valid licence for dogging.

Licensing/Regulatory Information

Refer to Unit Descriptor

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Pre-Requisites

Prerequisite units

CPCCLDG3001A	Licence to perform dogging

Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	1.1. Task to be undertaken is assessed. 1.2. Potential workplace ***hazards*** are identified. 1.3. ***Hazard control measures*** are identified consistent with ***appropriate standards*** to ensure the safety of personnel and equipment. 1.4. Site information is obtained. 1.5. All ***forces and loads*** associated with erecting and dismantling ***structures*** and ***associated plant*** are considered in consultation with ***appropriate personnel***. 1.6. ***Rigging equipment*** and ***associated equipment*** are identified in consultation with appropriate personnel according to ***procedures*** and site information.

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ELEMENT	PERFORMANCE CRITERIA
	1.7. *Safety equipment* is identified.
	1.8. Appropriate ***communication methods*** are identified with appropriate personnel.
2. Select and inspect equipment.	2.1. Rigging equipment and associated equipment are selected and inspected according to procedures and the appropriate standard.
	2.2. Safety equipment is selected and inspected according to procedures.
	2.3. All defective rigging equipment, associated equipment and safety equipment is isolated, reported and recorded according to procedures.
	2.4. ***Communication equipment*** is selected and inspected for serviceability (where applicable.
3. Set up task.	3.1. Appropriate ***hazard prevention***/***control measures*** are applied to the work area according to procedures.
	3.2. ***Ground suitability*** is inspected and checked (where appropriate).
	3.3. Site information is reviewed, interpreted and communicated to appropriate personnel and ***appropriate personnel***.
	3.4. All forces and loads associated with erecting and dismantling structures and associated plant are determined in consultation with appropriate personnel.
	3.5. Safety equipment is fitted and worn correctly (where appropriate).
	3.6. Rigging equipment and associated plant are positioned for work application and stability according to procedures.
	3.7. Methods of applying ***temporary connections*** using fibre rope are applied according to procedures and the appropriate standard.
4. Erect structures and plant.	4.1. Structures and associated plant are erected according to procedures and site information.
	4.2. Stability of structures and associated plant is maintained during erection according to procedures.
	4.3. Work is conducted safely at heights including safe and effective use of safety equipment.
	4.4. Appropriate communication methods and communication equipment, are used to co-ordinate the tasks.
	4.5. Associated plant and rigging equipment is used

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ELEMENT	PERFORMANCE CRITERIA
	according to procedures and the appropriate standard. 4.6. Temporary guys, ties, propping and shoring, including ***flexible steel wire rope***, and tubing, are connected where required. 4.7. Associated equipment is used in a safe and appropriate manner. 4.8. The completed task is inspected according to the appropriate standard. 4.9. Excess materials are removed from the work area (where applicable).
5. Dismantle structures and plant.	5.1. Structures and associated plant are dismantled according to procedures and the appropriate standard. 5.2. Work is conducted safely at heights including safe and effective use of safety equipment. 5.3. Stability of structures and associated plant is maintained during dismantling according to procedures. 5.4. Rigging equipment, associated equipment, safety equipment and associated plant are inspected for damage and defects. 5.5. All defective rigging equipment, associated equipment, associated plant and safety equipment are isolated reported and recorded according to procedures. 5.6. Rigging equipment and associated equipment are stored. according to procedures and the appropriate standard. 5.7. Hazard prevention/control measures are removed (where appropriate).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

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REQUIRED SKILLS AND KNOWLEDGE

Required skills for this unit are:

- ability to calculate Safe Working Load (SWL) and Working Load Limit (WLL)
- ability to erect and dismantle, level, plumb and stabilise associated plant and structures
- ability to work safely at heights including the correct application of safety equipment.
- accurate interpretation of basic structural charts and structural plans (site information)
- applying methods for making temporary connections of ropes using fibre and synthetic types
- apply methods of splicing and whipping fibre and synthetic ropes
- correct application and use of all rigging and associated equipment
- risk assessment and hazard control strategies
- interpersonal and communication skills at a level sufficient to site/workplace requirements. This includes the relevant communication methods and equipment.
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- appropriate mathematical procedures for estimation and measurement of loads
- ability to interpret manufacturer's specifications for all plant and equipment use in rigging operations
- knowledge of principles relating to all plant, equipment and structural stability
- knowledge of the types and functions of rigging, safety and associated equipment including an understanding of their limitations.
- organisational and workplace standards, requirements, policies and procedures for rigging
- understanding of the hierarchy of hazard identification and control
- relevant Commonwealth, state or territory and local government OHS legislation, standards and codes of practice for undertaking rigging activities
- understanding of inspection and maintenance requirements of a wide range of appropriate plant and equipment in line with Australian Standards or manufacturer's specifications
- estimation of ground bearing pressures of the full range of soil types and associated ground conditions for setting up plant and equipment.

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Evidence Guide

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

Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work.

State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment endorsed by the national body responsible for OHS matters for the assessment of this unit.

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 ability to:

- comply with OHS licensing legislation.
- effectively communicate and work safely with others in the work area.
- effectively conduct risk assessment and management procedures.
- effectively complete the following tasks:-
  - inspection of all plant and equipment, and
  - installation of a fall arrest system (Static line), and
  - use of a safety harness / fall arrest system, and
  - installation of crane loading platforms and
  - installation of a safety net, and
  - installation of a shutter and safety screen, and
  - demonstrated ability to work safely at heights, and
  - erection of structural steel, and
  - erection of precast panel, and
  - set up and operation of a winch for load movement, and
  - installation of a materials hoist, or
  - installation of a mast climber.
- effectively demonstrate the following knots,

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	bends and hitches:- • Sheet bend, • Becket hitch, • Running bowline, • Double bowline. • effectively demonstrate the following splices and whippings:- • Eye splice, • Back splice, • Short splice, • Sail makers whipping, • Common whipping, • West countryman's
Context of and specific resources for assessment	Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the National OHS endorsed Assessment Instrument. Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace. Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. Assessment is to comply with the requirements of any relevant Standards or operating procedures for basic rigging. Applicants must have access to: • personal protective equipment (PPE) for the purpose of the Performance Assessment. • appropriate safety equipment in safe condition • appropriate rigging equipment, associated equipment associated plant in safe condition as described in the endorsed assessment instrument • communication equipment (e.g. two-way

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EVIDENCE GUIDE	
	radios) where applicable • appropriate materials as required for safe erection of structures • appropriate materials for conducting fibre rope slicing, whipping, knots, bends and hitches.
Method of assessment	Assessment must be conducted using the national OHS endorsed Assessment Instruments. These Instruments provide advice on their application. The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**. Assessment may be in conjunction with the assessment of other units of competency. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

Range Statement

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.	
Hazards may include but are not limited to:	• ground stability (e.g. ground condition, recently filled trenches, slopes) • overhead hazards (e.g. power lines, service pipes) (**NB**: minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or

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RANGE STATEMENT

	electrical supply authority.) • traffic (e.g. pedestrians, vehicles, other plant) • insufficient lighting • environmental conditions (e.g. wind, lightning, storms) • other specific hazards (e.g. dangerous materials).
Hazard control measures:	Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk: • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment.
Appropriate standards may include:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
Site Information may include, but not limited to:	• local conditions such as access and egress, • work method statements, • site specific job safety analyses and other site specific documentation as required. • task plans / Schedules and structural plans.
Forces and Loads may include, but not limited to:	• dead loads • live loads • static load • dynamic loads • wind loads.
Structures may include but are not limited to:	• structural steel • precast panels.
Associated plant may include but not limited to:	• static lines • safety nets • hoists

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RANGE STATEMENT

	• mast climbers • loading platforms.
Appropriate personnel may include:	• engineers • supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations.

Rigging Equipment may include but is not limited to:	• scaffolds
	• elevated work platforms
	• personnel box
	• cantilevered crane loading platforms
	• mast climbers.
	• safety screens and shutters
	• cranes including but not limited to:
	  • non-slewing cranes
	  • mobile slewing cranes
	  • vehicle loading cranes
	  • tower cranes
	  • self-erecting tower cranes
	  • portal boom cranes
	  • derrick cranes
	  • bridge and gantry cranes.

Associated equipment may include but is not limited to:	• all types of power and manually operated lifting gear • fibre ropes • flexible steel wire rope (FSWR) • chains • wire and synthetic slings • shackles • terminations • wedge sockets • eye bolts • beam clamps • plate clamps • rope grips • turnbuckles • rigging screws • chain blocks • lever blocks • lever-action winches

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RANGE STATEMENT

	• sheaves • spreader bars • lifting beams • jacks • levers • skates • wedges • rollers • girder trolley
Procedures may include but is not limited to:	• manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures, relevant codes of practice • workplace procedures (work instructions, operating procedures, checklists).
Safety Equipment may include but not limited to:	• safety harness • energy absorber • lanyard • inertia reel • static safety lines • safety nets.
Communication Methods may include but is not limited to:	• verbal and non-verbal language • written instructions • signage • hand signals • listening, • questioning to confirm understanding, and appropriate worksite protocol. **NB**: Mobile phones are not to be used for signalling purposes during the rigging process.
Communication equipment may include but is not limited to:	• fixed channel two-way radios
Hazard prevention/control measures may include but is not limited to:	• safety tags on electrical switches/isolators • powerlines are insulated • safety observer used inside exclusion zone • power disconnected • traffic barricades and control • pedestrian barricades • trench covers

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RANGE STATEMENT

	• movement of obstructions • personal protective equipment • adequate illumination • safety shutters and screens.
Ground suitability may include but is not limited to:	• rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete • suspended concrete floors • building roofs • landings • ground bearing pressure.
Appropriate personnel may include but not limited to	• other riggers • doggers • crane operators.
Temporary connections may include but not limited to:	• knots • bends • hitches • spicing • whipping.
Flexible Steel Wire Rope (***FSWR***) includes:	• identification, uses and connections. May include termination for: • static lines, • guys, • purchase systems, • lashing, • cranes, • hoist and winch ropes.

Unit Sector(s)

Unit sector Construction

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Co-requisite units

Co-requisite units Nil

Functional area

Functional area

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CPCCLRG3002A Licence to perform rigging intermediate level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit specifies the outcomes required to perform rigging work at the intermediate level, which includes all the outcomes for rigging work at the basic level, and also includes rigging of cranes, rigging of conveyors, rigging of dredges and excavators, rigging associated with tilt slabs, rigging associated with demolition work, and dual lifts for licensing purposes.

Application of the Unit

Application of the unit

This unit requires the applicant to be able plan the work, select and inspect equipment, set up task, erect structures and plant and dismantle structures and plant.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

This unit has a pre-requisite requirement. This requirement may be met by either the successful completion of the unit *CPCCLRG3001A Licence to perform rigging basic level* or holding a valid licence for basic rigging.

Licensing/Regulatory Information

Refer to Unit Descriptor

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Pre-Requisites

Prerequisite units

CPCCLRG3001A	Licence to perform rigging basic level

Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	1.1. Task to be undertaken is assessed 1.2. Potential workplace ***hazards*** are identified 1.3. ***Hazard control measures*** are identified consistent with ***appropriate standards*** to ensure the safety of personnel and equipment 1.4. Site information is obtained 1.5. All ***forces and loads*** associated with erecting and dismantling ***structures*** and ***associated plant*** are considered in consultation with ***appropriate personnel***. 1.6. ***Rigging equipment*** and ***associated equipment*** are identified in consultation with appropriate personnel

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ELEMENT	PERFORMANCE CRITERIA
	according to ***procedures*** and site information.
	1.7. *Safety equipment* is identified.
	1.8. Appropriate ***communication methods*** are identified with appropriate personnel.
2. Select and inspect equipment.	2.1. Rigging equipment and associated equipment are selected and inspected according to procedures and the appropriate standard.
	2.2. Safety equipment is selected and inspected according to procedures.
	2.3. All defective rigging equipment, associated equipment and safety equipment is isolated, reported and recorded according to procedures.
	2.4. ***Communication equipment*** is selected and inspected for serviceability (where applicable)
3. Set up tasks.	3.1. Appropriate ***hazard prevention***/***control measures*** are applied to the work area according to procedures.
	3.2. ***Ground suitability*** is inspected and checked (where appropriate).
	3.3. Site information is reviewed, interpreted and communicated to appropriate personnel and ***appropriate personnel***.
	3.4. All forces and loads associated with erecting and dismantling structures and associated plant are determined in consultation with appropriate personnel.
	3.5. Safety equipment is fitted and worn correctly (where appropriate).
	3.6. Rigging equipment and associated plant are positioned for work application and stability according to procedures.
4. Erect structures and plant.	4.1. Structures and associated plant is erected according to procedures and site information.
	4.2. Stability of structures and associated plant is maintained during erection according to procedures.
	4.3. Work is conducted safely at heights including safe and effective use of safety equipment.
	4.4. Appropriate communication methods and communication equipment, are used to co-ordinate the tasks.
	4.5. Temporary guys, ties, propping and shoring, including ***flexible steel wire rope***, and tubing, are connected where required.

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ELEMENT	PERFORMANCE CRITERIA
	4.6. Associated plant and rigging equipment is used according to procedures and the appropriate standard. 4.7. Associated equipment is used in a safe and appropriate manner. 4.8. The completed task is inspected according to the appropriate standard. 4.9. Excess materials are removed from the work area (where applicable)
5. Dismantle structures and plant.	5.1. Structures and associated plant are dismantled according to procedures and the appropriate standard. 5.2. Work is conducted safely at heights including safe and effective use of safety equipment. 5.3. Stability of structures and associated plant is maintained during dismantling according to procedures. 5.4. Rigging equipment, associated equipment, safety equipment and associated plant are inspected for damage and defects 5.5. All defective rigging equipment, associated equipment, associated plant and safety equipment are isolated reported and recorded according to procedures. 5.6. Rigging equipment and associated equipment are stored according to procedures and the appropriate standard. 5.7. Hazard prevention/control measures are removed (where appropriate)

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- ability to calculate Safe Working Load (SWL) and Working Load Limit (WLL)

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REQUIRED SKILLS AND KNOWLEDGE

- ability to erect and dismantle, level, plumb and stabilise associated plant and structures
- ability to work safely at heights including the correct application of safety equipment.
- accurate interpretation of structural charts and structural plans (site information)
- correct application and use of all rigging and associated equipment
- risk assessment and hazard control strategies
- interpersonal and communication skills at a level sufficient to site/workplace requirements. This includes the relevant communication methods and equipment.
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- appropriate mathematical procedures for estimation and measurement of loads
- ability to interpret manufacturer's specifications for all plant and equipment use in rigging operations
- knowledge of principles relating to all plant, equipment and structural stability
- knowledge of the types and functions of rigging, safety and associated equipment including an understanding of their limitations
- organisational and workplace standards, requirements, policies and procedures for rigging
- understanding of the hierarchy of hazard identification and control
- relevant Commonwealth, state or territory and local government OHS legislation, standards and codes of practice for undertaking rigging activities
- understanding of inspection and maintenance requirements of a wide range of appropriate plant and equipment in line with Australian Standards or manufacturer's specifications
- estimation of ground bearing pressures of the full range of soil types and associated ground conditions for setting up plant and equipment.

Evidence Guide

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	Successful assessment of this unit meets the competency requirement of the National Standard

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EVIDENCE GUIDE

	for licensing Persons Performing High Risk Work. State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment for this unit which have been endorsed by the national body responsible for OHS matters.

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 ability to:
	• comply with OHS licensing legislation.
	• effectively communicate and work safely with others in the work area.
	• effectively conduct risk assessment and management procedures.
	• effectively complete the following tasks:
	  • adding and removing a tower crane section, or
	  • adding and removing a crane lattice boom section, or
	  • erecting a non guyed tower (e.g. light tower, and
	  • perform a multiple crane lift, or
	  • a multiple winch lift, or
	  • a combination of a crane and winch lift, and
	  • lifting and installing a series of tilt-up panels, or
	  • lifting and installing a series of scenery panels (i.e. entertainment industry), and
	  • demolish/remove a series of tilt-up panel structures, or
	  • demolish/remove a series of scenery panel structures, and
	  • demolishing a concrete encased structural steel column and beam.
	• **NB**: All specifications for these performance tasks are detailed in the endorsed assessment instrument.
	• effectively conduct pre and post operational checks of intermediate rigging equipment.

Context of and specific resources for assessment	Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the

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EVIDENCE GUIDE

	endorsed Assessment Instrument. Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace. Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. Assessment is to comply with relevant appropriate standard requirements. Applicants must have access to: • personal protective equipment (PPE) for the purpose of the Performance Assessment • appropriate safety equipment is safe condition • appropriate rigging equipment, associated equipment associated plant in safe condition as described in the endorsed assessment instrument • communication equipment (e.g. radios) where applicable • appropriate materials as required for safe erection of structures.
Method of assessment	Assessment must be conducted using the endorsed Assessment Instruments. These Instruments provide advice on their application. The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**. Assessment may be in conjunction with the assessment of other units of competency. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.

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EVIDENCE GUIDE

Guidance information for assessment	Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

Range Statement

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.

Hazards may include but not limited to:	• ground stability (e.g. ground condition, recently filled trenches, slopes) • overhead hazards (e.g. power lines, service pipes) (**NB**: Minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or electrical supply authority) • traffic (e.g. pedestrians, vehicles, other plant) • insufficient lighting • environmental conditions (e.g. wind, lightning, storms) • other specific hazards (e.g. dangerous materials).
Hazard control measures:	Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk: • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment.

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RANGE STATEMENT

Appropriate standards may include but are not limited to:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
Site Information may include but is not limited to:	• local conditions such as access and egress • work method statements • site-specific job safety analyses and other site specific documentation as required • task plans /schedules and structural plans.
Forces and Loads may include but are not limited to:	• dead loads • live loads • static load • dynamic loads • wind loads.
Structures may include but not limited to:	• concrete tilt-up panels • scenery panels (used in entertainment) • non guyed light towers.
Associated plant may include but is not limited to:	• all types of cranes • conveyors • dredges • excavators.
Appropriate personnel may include but not limited to:	• supervisors • engineers • colleagues • managers who are authorised to take responsibility for the workplace or operations.

Rigging Equipment may include but is not limited to:	• scaffolds
	• elevated work platforms
	• stages
	• personnel box
	• cantilevered crane loading platforms,
	• mast climbers
	• safety screens and shutters
	• cranes including but not limited to:
	  • non-slewing cranes
	  • mobile slewing cranes
	  • vehicle loading cranes
	  • tower cranes

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RANGE STATEMENT

	• self-erecting tower cranes • portal boom cranes • derrick cranes • bridge and gantry cranes.
Associated equipment may include but is not limited to:	• all associated equipment at the basic rigging level, and • lifting clutches (swift lifts) • chain motors.
Procedures may include but are not limited to:	• manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures, relevant codes of practice • workplace procedures (work instructions, operating procedures, checklists).
Safety Equipment may include but not limited to:	• safety harness • energy absorber • lanyard • inertia reel • safety nets • static lines.
Communication Methods may include but not limited to:	• verbal and non-verbal language • written instructions • signage • hand signals • listening, • questioning to confirm understanding, and appropriate worksite protocol. **NB**: Mobile phones are not to be used for signalling purposes during the rigging process.
Communication equipment may include but is not limited to:	• fixed channel two-way radios
Hazard prevention/control measures may include but is not limited to:	• safety tags on electrical switches/isolators • powerlines are insulated • safety observer used inside exclusion zone • power disconnected • traffic barricades and control • pedestrian barricades • trench covers • movement of obstructions

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RANGE STATEMENT

	• personal protective equipment • adequate illumination.
Ground suitability may include but is not limited to:	• rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete • suspended concrete floors • building roofs • landings • ground bearing pressure.
Appropriate personnel may include but not limited to:	• other riggers • doggers • crane operators.
Flexible Steel Wire Rope (***FSWR***) includes:	• identification, uses and connections. May include termination for: • static lines • guys • purchase systems • lashing • cranes • hoist and winch ropes.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

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Functional area

Functional area

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CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit specifies the outcomes required to erect, alter and dismantle scaffolding at the basic level, consisting of scaffolding work connected with the operation or use of modular or pre-fabricated scaffolds, cantilevered materials hoists with a maximum working load of 500kg, ropes and gin wheels, safety nets and static lines, and bracket scaffolds (tank and formwork) for licensing purposes.

Application of the Unit

Application of the unit This unit covers the scope of work to plan the job, select and inspect equipment, set up task, erect scaffold and scaffold equipment and dismantle scaffold and scaffold equipment.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form it state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units Nil

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Prerequisite units Nil

Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	1.1. Task to be undertaken is assessed. 1.2. Potential workplace ***hazards*** are identified. 1.3. ***Hazard control measures*** are identified consistent with ***appropriate standards*** to ensure the safety of personnel and equipment. 1.4. Site information is obtained. 1.5. ***Scaffold***, ***associated equipment*** and ***scaffolding equipment*** are identified from site information and in consultation with ***appropriate personnel*** (where applicable). 1.6. ***Safety equipment*** is identified. 1.7. All ***forces and loads*** exerted on and by the scaffold and/or scaffolding equipment are determined and calculated. 1.8. Appropriate ***communication methods*** are identified

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ELEMENT	PERFORMANCE CRITERIA
	with appropriate personnel.
2. Select and inspect plant and equipment.	2.1. Scaffold, associated equipment and scaffold equipment are selected and inspected according to ***procedures*** and site information. 2.2. Safety equipment is selected and inspected according to procedures. 2.3. All defective Scaffold, associated equipment, scaffold equipment and safety equipment are isolated according to procedures. 2.4. All defective Scaffold, associated equipment, scaffold equipment and safety equipment are reported and recorded according to procedures. 2.5. ***Communication equipment*** is selected and inspected for serviceability (where applicable).
3. Set up task	3.1. Appropriate ***hazard prevention***/***control measures*** are applied to the work area according to procedures. 3.2. Ground suitability is checked. 3.3. Appropriate footings are prepared to support scaffold and scaffold equipment according to procedures and the appropriate standard. 3.4. Scaffold and scaffold equipment are prepared for erection according to procedures and the appropriate standard. 3.5. Safety equipment is fitted and secured according to procedures (where applicable). 3.6. Scaffold and scaffold equipment are positioned for work application and ***stability*** according to procedures and the appropriate standard.
4. Erect scaffold and scaffold equipment.	4.1. Scaffold and scaffold equipment are erected according to procedures and the appropriate standard. 4.2. Work is conducted safely at heights including safe and effective use of safety equipment. 4.3. Scaffold and scaffold equipment are erected consistent with site information. 4.4. Appropriate communication methods are used to coordinate the tasks. 4.5. Completed tasks are inspected for compliance with the appropriate standard. 4.6. Handover certificate is completed as required and handed to appropriate personnel. 4.7. Excess materials from the work area are removed

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ELEMENT	PERFORMANCE CRITERIA
	(where applicable).
5. Dismantle scaffold and scaffold equipment.	5.1. Scaffold and scaffold equipment are dismantled according to procedures and the appropriate standard. 5.2. Work is conducted safely at heights including safe and effective use of safety equipment. 5.3. Scaffold, associated equipment and scaffold equipment are inspected for damage and defects. 5.4. All damaged and defective scaffold, associated equipment and scaffold equipment are tagged and isolated according to procedures. 5.5. Hazard prevention/control measures are removed (where appropriate). 5.6. All damaged and defective scaffold, associated equipment and scaffold equipment are reported and recorded according to procedures and appropriate action taken.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- ability to calculate Safe Working Load (SWL) and Working Load Limit (WLL)
- ability to erect scaffold within the scope of the basic scaffolder
- ability to erect, level, plumb and stabilise cantilever hoists and scaffolds
- ability to interpret manufacturer's specifications for plant and equipment
- ability to work safely at heights
- ability to set up fall arrest systems, including safety nets
- ability to work safely in confined spaces
- accurate interpretation of basic structural charts and structural plans
- applying methods for making temporary connection using fibre ropes
- correct application of all scaffolding equipment
- methods for making temporary connection of guy ropes and static lines using Flexible Steel Wire Rope (FSWR)
- verify problems and equipment faults and demonstrate appropriate response.

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REQUIRED SKILLS AND KNOWLEDGE

Required knowledge

Required knowledge for this unit is:

- use of appropriate mathematical procedures for estimation and measurement of loads Commonwealth, state or territory OHS legislation and local government regulations, including standards and codes of practice relevant to the full range of techniques for undertaking basic scaffolding activities
- knowledge of principles relating to plant and equipment stability
- knowledge of types of scaffolding and their application
- knowledge of scaffolding erection and dismantling techniques
- knowledge of types of hoists, plant and equipment associated with basic scaffolding and their use/s
- risk assessment and control, including understanding of the hierarchy of control
- estimation of bearing pressures of the full range of soil types and associated ground conditions for setting up plant and equipment
- load capabilities of different types of scaffolding constructions
- understanding and application of organisational and workplace standards, requirements, policies and procedures for scaffolding
- safety equipment applicable to scaffolding
- understanding and application of the inspection and maintenance requirements for basic scaffold, associated equipment and scaffold equipment
- uses and limitations of tools and equipment, appropriate to scaffolding tasks and activities.

Evidence Guide

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	Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work. State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for Assessment endorsed by the national body responsible for OHS matters for the assessment of

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EVIDENCE GUIDE

	this unit.

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 ability to:
	• comply with OHS licensing requirements.
	• effectively communicate and work safely with others in the work area.
	• effectively apply risk assessment and hazard management procedures at a basic scaffolder level.
	• effectively complete the planning, erection and dismantling of a scaffolding system, in accordance with procedures, including a minimum of erect and dismantle:
	  • Modular Scaffold with return and ladder access and platform brackets (hop-up brackets)
	  • Bracket Scaffold
	  • Mobile Scaffold
	  • gin wheel
	  • Cantilever Hoist
	  • safety net and static line
	  • safety screen
	Scaffold to be of a minimum height of at least 5.0 metres above the supporting surface with full edge protection (includes safety screen) for each work platform including toe boards and handrails.
	• correctly demonstrate fibre rope bends and hitches.
	• effectively conduct pre and post operational checks of basic scaffolding.
	• complete handover certificate as required.

Context of and specific resources for assessment	• Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the National OHS endorsed Assessment Instrument • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting • .Assessors must ensure that the assessment in

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EVIDENCE GUIDE

	the workplace is organised to ensure that all the required equipment and materials and a suitable working area is made available to suit the assessment and the workplace
	• Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints for basic scaffolding
	• Applicants must have access to:
	  • personal protective equipment (PPE) for the purpose of the Performance Assessment
	  • appropriate safety equipment in safe condition
	  • appropriate scaffolding and associated scaffolding equipment
	  • communication equipment (e.g. fixed channel two way radios) where applicable
	  • appropriate personnel to assist with the erecting and dismantling of scaffold and scaffold equipment.

Method of assessment	Assessment must be conducted using the national OHS endorsed Assessment Instruments. These Instruments provide advice on their application. Assessment may be in conjunction with the assessment of other units of competency. The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	Further information about endorsed Assessment Instruments may be obtained from state/territory OHS regulators.

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Range Statement

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.

Hazards may include but not limited to:	• ground conditions (e.g. ground bearing pressure/s, back filled trenches, underground services, slopes) • overhead hazards (e.g. power lines, service pipes) (minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or electrical supply authority) • traffic (e.g. pedestrians, vehicles, other plant) • insufficient lighting • environmental conditions (e.g. wind, lightning, storms) • other site specific hazards (e.g. hazardous materials).
Hazard control measures:	Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk: • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment.
Appropriate standards may include:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
Site Information may include, but not be limited to:	• local conditions such as access and egress • work method statements

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	• site-specific job safety analyses and other documentation as required • task plans.

Scaffold may include but not limited to:	• mobile scaffolding
	• bracket scaffolding
	• modular scaffolding, including:
	  • steel
	  • fibreglass and
	  • aluminium frame scaffolding
	• prefabricated scaffolding.

Associated equipment may include but not limited to:	• planks
	• flexible steel wire rope and fittings.
	NB: including identification, uses and connections which may include termination for static lines and guys for cantilever hoists.
	• ladders
	• tie tubes and fittings
	• fibre rope
	NB: including identification and uses (natural and synthetic), and connections associated with bends and hitches.
	• stairways and screening
	• hand tools, including, but not limited to:
	  • box spanners
	  • hammers
	  • spirit levels
	  • tape measures
	  • scaffold belts
	  • podgers
	  • hammers
	  • wire nips
	  • wrenches
	  • torpedo levels
	  • shovels
	  • spanners
	  • cutters
	  • hammer drills
	  • sledge hammers

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RANGE STATEMENT

	• wheel barrows and • relevant maintenance equipment.
Scaffolding equipment may include but not limited to:	• materials hoists • gin wheels • safety nets • static lines and fittings.
Appropriate personnel may include, but are not limited to:	• supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations • other scaffolders • other site personnel as applicable.
Safety equipment may include but not limited to:	• safety harness • energy absorber • lanyard • inertia reel.
Forces and Loads may include, but are not limited to:	• dead loads • live loads • static load • dynamic loads • wind loads.
Communication Methods may include but not limited to:	• verbal and non-verbal language • written instructions • signage • communication signals • listening • questioning to confirm understanding, and appropriate worksite protocol.
Procedures may include but not limited to:	• manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures, relevant codes of practice • workplace procedures (work instructions, operating procedures, checklists) • reporting and recording procedures such as e.g. equipment defect/s.
Communication equipment may include but is not limited to:	• fixed frequency two way radios • mobile phones.
Hazard prevention/control measures may include but not	• safety tags on electrical switches/isolators • safety observer used inside exclusion zone

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limited to:	(e.g. Spotter), to include the use of power line warning systems (e.g. Tiger tails) • power disconnected by competent authority where applicable • traffic and pedestrian barricades and controls • safe and adequate access / egress is established • personal protective equipment • adequate illumination.
Ground suitability may include but not limited to:	• rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete.
Stability may include but is not limited to:	• ground bearing pressure • sole plates/boards • screw jacks • levelling • ties/guys.

Unit Sector(s)

Unit sector Construction

Co-requisite units

Co-requisite units Nil

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Functional area

Functional area

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CPCCLSF3001A Licence to erect, alter and dismantle scaffolding intermediate level

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit specifies the outcomes required to erect, alter and dismantle scaffolding at the Intermediate level which includes use and operation of Cantilevered crane-loading platforms, Cantilevered and spurred scaffolds, Barrow ramps and sloping platforms, perimeter safety screens and shutters Mast climbers, and tube and coupler scaffolds (including tube and coupler covered ways and gantries) for licensing purposes.

Application of the Unit

Application of the unit

This unit covers the scope of work to plan the job, select and inspect equipment, set up task, erect scaffold and scaffold equipment and dismantle scaffold and scaffolding equipment.

This unit is based upon the National Standard for Licensing Persons Performing High Risk Work.

This unit in its current form meets state and territory licensing requirements. Any alteration will result in a unit which is not acceptable to regulators for the purpose of licensing.

This unit has a pre-requisite requirement. This requirement may be met by either the successful completion of the unit *CPCCLSF2001A Licence to erect, alter and dismantle scaffolding basic level* or holding a valid licence for basic scaffolding.

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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units

	CPCCLSF2001A	Licence to erect, alter and dismantle scaffolding basic level

Employability Skills Information

Employability skills 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

ELEMENT	PERFORMANCE CRITERIA
1. Plan job.	1.1. Task to be undertaken is assessed. 1.2. Potential workplace ***hazards*** are identified. 1.3. ***Hazard control measures*** are identified consistent with ***appropriate standards*** to ensure the safety of personnel and equipment. 1.4. Site information is obtained.

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ELEMENT	PERFORMANCE CRITERIA
	1.5. ***Scaffold***, ***associated equipment*** and ***scaffold equipment*** are identified from site information and in consultation with appropriate ***personnel*** (where applicable).
	1.6. ***Safety equipment*** is identified.
	1.7. All ***forces and loads*** exerted on and by the scaffold and/or scaffolding equipment are determined and calculated.
	1.8. Appropriate ***communication methods*** are identified with appropriate personnel.
2. Select and inspect equipment.	2.1. Scaffold, associated equipment and scaffold equipment are selected and inspected according to ***procedures*** and site information.
	2.2. Safety equipment is selected and inspected according to procedures.
	2.3. All defective scaffold, associated equipment, scaffold equipment and safety equipment are isolated according to procedures.
	2.4. All defective scaffold, associated equipment, scaffold equipment and safety equipment are reported and recorded according to procedures.
	2.5. ***Communication equipment*** is selected and inspected for serviceability (where applicable).
3. Set up task.	3.1. Appropriate ***hazard prevention***/***control measures*** are applied to the work area according to procedures.
	3.2. Ground suitability is checked.
	3.3. Appropriate footings are prepared to support scaffold and scaffold equipment according to procedures and the appropriate standard.
	3.4. Scaffold and scaffold equipment are prepared for erection
	3.5. Fit safety equipment and secure according to procedures (where applicable).
	3.6. Scaffold and scaffold equipment are positioned for work application and ***stability*** according to procedures and the appropriate standard.
4. Erect scaffold and scaffolding equipment.	4.1. Scaffold and scaffold equipment are erected according to procedures and the appropriate standard.
	4.2. Work is conducted safely at heights including safe and effective use of safety equipment.
	4.3. Scaffold and scaffold equipment are erected

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ELEMENT	PERFORMANCE CRITERIA
	consistent with site information. 4.4. Appropriate communication methods are used to coordinate the tasks. 4.5. Completed tasks are inspected for compliance with the appropriate standard. 4.6. Handover certificate is completed as required and handed to appropriate personnel. 4.7. Excess materials from the work area are removed (where applicable).
5. Dismantle scaffold and scaffolding equipment.	5.1. Scaffold and scaffold equipment are dismantled according to procedures and the appropriate standard. 5.2. Work is conducted safely at heights including safe and effective use of safety equipment. 5.3. Scaffold, associated equipment and scaffold equipment are inspected for damage and defects. 5.4. All damaged and defective scaffold, associated equipment and scaffold equipment are tagged and isolated according to procedures. 5.5. Hazard prevention/control measures are removed (where appropriate). 5.6. All damaged and defective scaffold, associated equipment and scaffold equipment are reported and recorded according to procedures and appropriate action taken.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills for this unit are:

- ability to erect scaffold and scaffolding equipment within the scope of the intermediate scaffolder
- ability to erect, level, plumb and stabilise scaffolds and scaffold equipment within the scope of the intermediate scaffolder
- ability to interpret manufacturer's specifications for plant and equipment

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REQUIRED SKILLS AND KNOWLEDGE

- ability to work safely at heights
- accurate interpretation of basic structural charts and structural plans
- correct application of all scaffolding equipment
- verify problems and equipment faults and demonstrate appropriate response.

Required knowledge

Required knowledge for this unit is:

- use of appropriate mathematical procedures for estimation and measurement of loads
- Commonwealth, state or territory OHS legislation and local government regulations, including standards and codes of practice relevant to the full range of techniques for undertaking intermediate scaffolding activities
- knowledge of principles relating to plant and equipment stability
- knowledge of types of scaffolding and their application
- knowledge of scaffold and scaffold equipment erection and dismantling techniques
- knowledge of types of scaffold and scaffold equipment, associated with intermediate scaffolding and their use/s
- risk assessment and control, including understanding of the hierarchy of control
- load capabilities of different types of scaffolding constructions
- understanding and application of organisational and workplace standards, requirements, policies and procedures for scaffolding
- application of safety equipment applicable to scaffolding
- understanding and application of the inspection and maintenance requirements for intermediate scaffold, associated equipment and scaffold equipment
- uses and limitations of tools and equipment, appropriate to scaffolding tasks and activities.

Evidence Guide

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	Successful assessment of this unit meets the competency requirement of the National Standard for licensing Persons Performing High Risk Work. State/Territory OHS regulators have mandated the use of Assessment Instruments and Instructions for

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EVIDENCE GUIDE

	Assessment endorsed by the national body responsible for OHS matters for the assessment of this unit.

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 ability to:
	• Effectively communicate and work safely with others in the work area.
	• Effectively apply risk assessment and hazard management procedures at an intermediate scaffolder level.
	• Effectively complete the planning, erection and dismantling of scaffolding systems, in accordance with procedures, including a minimum of erect and dismantle the following:
	  • Cantilevered and spurred scaffolds
	  • Barrow ramps and/ or sloping platforms
	  • Tube and coupler scaffolds
	  • Cantilevered crane-loading platforms
	  • Mast climbers
	Cantilevered, spurred and tube and coupler scaffolds to be of a minimum height of 5.0 metres above the supporting surface with full edge protection, for each work platform including toe boards and handrails.
	• Apply safety screen to tube and coupler scaffold.
	• Effectively conduct compliance inspections of scaffold and scaffold equipment for intermediate scaffolding.
	• Complete handover certificate as required.

Context of and specific resources for assessment	• Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the National OHS endorsed Assessment Instrument. • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. • Assessors must ensure that the assessment in the workplace is organised to ensure that all the required equipment and materials and a

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EVIDENCE GUIDE

	suitable working area is made available to suit the assessment and the workplace.
	• Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints for intermediate scaffolding.
	• Applicants must have access to:
	  • personal protective equipment (PPE) for the purpose of the Performance Assessment
	  • appropriate safety equipment in safe condition
	  • appropriate scaffold and scaffold equipment in safe condition
	  • site information as described in the mandated assessment instrument
	  • communication equipment (e.g. fixed channel two way radios) where applicable
	  • appropriate personnel to assist with the erecting and dismantling of scaffold and scaffold equipment.

Method of assessment	Assessment must be conducted using the national OHS endorsed Assessment Instruments. These Instruments provide advice on their application. Assessment may be in conjunction with the assessment of other units of competency. The use of **'simulators'** in the assessment of this unit of competency is **not acceptable**. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	Further information about endorsed assessment instruments may be obtained from state/territory OHS regulators.

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Range Statement

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.

Hazards may include but not limited to:	• ground conditions (e.g. ground bearing pressure/s, back filled trenches, underground services, slopes) • overhead hazards (e.g. power lines, service pipes) (minimum clearance distance from powerlines or electrical equipment as determined by relevant state authority or electrical supply authority.) • traffic (e.g. pedestrians, vehicles, other plant) • insufficient lighting • environmental conditions (e.g. wind, lightning, storms) • other site specific hazards (e.g. hazardous materials).
Hazard control measures:	Refers to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes the application of the hierarchy of control, the six-step preference of control measures to manage and control risk: • elimination • substitution • isolation • engineering control measures • using safe work practices • personal protective equipment.
Appropriate standards may include:	• codes of practice • legislation • Australian Standards • manufacturer's specifications • industry standards (where applicable).
Site Information may include, but not limited to:	• local conditions such as access and egress • work method statements

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	• site-specific job safety analyses and other documentation as required • task plans.
Scaffold may include but not limited to:	• all scaffolds at the basis level • cantilevered and spurred scaffolds • barrow ramps and sloping platforms • tube and coupler scaffolds (including tube and coupler covered ways and gantries) • cantilever loading platforms.
Associated equipment may include but not limited to:	• all associated equipment from basic scaffolding level • independent adjustable props.
Scaffold equipment may include but not limited to:	• all scaffold equipment at the basic level • mast climbers • screen and shutters.
Appropriate personnel may include, but are not limited to:	• supervisors • colleagues • managers who are authorised to take responsibility for the workplace or operations • other scaffolders • other site personnel as applicable.
Safety equipment may include but not limited to:	• safety harness • energy absorber • lanyard • inertia reel.
Forces and Loads may include, but are not limited to:	• dead loads • live loads • static load • dynamic loads • wind loads.
Communication Methods may include but not limited to:	• verbal and non-verbal language • written instructions • signage • communication signals • listening • questioning to confirm understanding, and appropriate worksite protocol.
Procedures may include but not limited to:	• manufacturer's guidelines (instructions, specifications or checklists) • industry operating procedures, relevant codes

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RANGE STATEMENT

	of practice • workplace procedures (work instructions, operating procedures, checklists) • reporting and recording procedures such as e.g. scaffold and scaffold equipment defects.
Communication equipment may include but not limited to:	• fixed frequency two way radios • mobile phones.
Hazard prevention/control measures may include but not limited to:	• safety tags on electrical switches/isolators • safety observer used inside exclusion zone (e.g. Spotter), to include the use of power line warning systems (e.g. Tiger tails) • power disconnected by competent authority where applicable. • traffic and pedestrian barricades and controls • safe and adequate access / egress is established • personal protective equipment • adequate illumination.
Ground suitability may include but not limited to:	• rough uneven ground • backfilled ground • soft soils • hard compacted soil • rock • bitumen • concrete.
Stability may include but not limited to:	• ground bearing pressure • sole plates/boards • screw jacks • levelling • ties/guys.

Unit Sector(s)

Unit sector Construction

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Co-requisite units

Co-requisite units Nil

Functional area

Functional area

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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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FWPHAR2206 Operate a mobile chipper/mulcher

Modification History

Release	Comment
1	Replaces equivalent unit FPIHAR2206B Operate a mobile chipper/mulcher, which was first released with FPI11 Forest and Forest Products Training Package Version 2.2. This is the first release of this unit in the new standards format.

Application

This unit of competency describes the outcomes required to operate a mobile chipping or mulching unit to chip or mulch timber refuse such as branches and other timber waste left after felling operations. Work is completed in a forest or forest farm setting.

The unit applies to those who operate a mobile chipping or mulching unit in a forest environment.

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

Pre-requisite Unit

Nil

Unit Sector

Harvesting and Haulage

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. Prepare for mobile chipping or mulching.	1.1 Review work order and where required check with appropriate personnel. 1.2 Select appropriate personal protective and other equipment and check for operational effectiveness. 1.3 Identify type and quantity of timber refuse to be chipped or

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	mulched. 1.4 Plan chipping or mulching activities in line with work order.
2. Chip or mulch timber refuse	2.1 Reject timber refuse assessed as unsuitable for chipping or mulching and dispose of or recycle in line with environmental protection practices. 2.2 Use equipment in line with organisational safety procedures, manufacturer's instructions and environmental protection requirements. 2.3 Position, secure and set up chipping and mulching unit in line with manufacturer's specifications and required size. 2.4 Direct timber refuse into chipper or mulcher at rate applicable to machine capacity. 2.5 Chip timber refuse to chip sizes specified in work order. 2.6 Respond to critical situations requiring emergency shutdown to prevent personal injury or damage to machine or product.
3. Complete operator maintenance.	3.1 Follow organisational safety procedures to lock out equipment. 3.2 Check cutters for wear and damage at appropriate or recommended intervals. 3.3 Remove, replace and dispose of cutters in line with manufacturer's recommendations, s ite procedures and environmental protection practices. 3.4 Complete operator maintenance tasks in line with manufacturer's recommendations and site procedures. 3.5 Record and report production outcomes and equipment faults to appropriate personnel.

Foundation Skills

This section describes those core and employment skills that are essential to performance and are not explicit in the performance criteria.	
Numeracy skills to:	• identify quantities of required material within work orders • read basic numerical machine settings and choose according to chip size • complete routine production records involving quantities tallied against orders.
Oral communication skills to:	• ask questions and actively listen to clarify contents of work orders.

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Reading skills to:	• interpret workplace health and safety and other organisational procedures
	  • work orders
	  • manufacturers' instructions and maintenance recommendations.

Writing skills to:	• complete accurate basic records for production outcomes and equipment faults.
Planning and organising skills to:	• efficiently and logically sequence the stages of preparation and processing activities using work order to guide activities.

Range of Conditions

Not Applicable

Unit Mapping Information

FPIHAR2206B Operate a mobile chipper/mulcher

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=0d96fe23-5747-4c01-9d6f-3509ff8d3d47

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Assessment Requirements for FWPHAR2206 Operate a mobile chipper/mulcher

Modification History

Release	Comment
1	Replaces equivalent unit FPIHAR2206B Operate a mobile chipper/mulcher, which was first released with FPI11 Forest and Forest Products Training Package Version 2.2. This is the first release of this unit in the new standards format. Assessment requirements now specify the performance and knowledge evidence, as well as assessment conditions for this unit of competency. These sections simplify and replace components used in the previous unit format, including Required Skills and Knowledge, Evidence Guide and Range Statement.

Performance Evidence

A person demonstrating competency in this unit must satisfy all of the elements, performance criteria and foundation skills of this unit. If a specific volume or frequency is not stated below, then evidence must be provided that the following requirements have been performed on at least one occasion:

- complete chipping and mulching jobs in line with individual work orders which prescribe different quantities of timber refuse and different chip sizes
- complete operator maintenance, including fuelling, safety checks, cleaning, lubricating, operational adjustments, cutter inspection, removal, disposal and replacement to manufacturer recommendations and site procedures.
-

Knowledge Evidence

A person competent in this unit must be able to demonstrate knowledge of:

- environmental protection practices for forest and forest farm settings:
  - reducing water and energy use
  - cleaning plant, tools and equipment
  - disposing of, recycling and reusing timber
- types of timber refuse suitable and unsuitable for chipping and mulching
- purpose, features and operation of mobile chipping and mulching units
- capacity of chippers and mulchers to cope with differing sizes and diameters of branch
- feed rates at which waste is fed into chippers and mulchers to optimise output without damaging or blocking machinery
- methods for checking cutting blade condition

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- operator maintenance procedures including for fuelling, safety checks, cleaning, lubricating, operational adjustments, cutter inspection, removal, disposal and replacement
- common hazards associated with chipping and mulching operations and methods to minimise associated risks
- organisational procedures specific to chipping and mulching timber refuse:
  - workplace health and safety with particular emphasis on equipment lock out and use of personal protective equipment
  - communication reporting lines
  - recording and reporting production outcomes and equipment faults.
  -

Assessment Conditions

The following resources must be made available:

- mobile chipping and mulching units feeding into a truck or other form of transportation:
  - truck mounted
  - trailer mounted
- tools and consumables for operator maintenance
- tools and equipment for removing and replacing cutters
- consumable cutters
- personal protective equipment suitable for chipping and mulching timber refuse
- timber refuse for processing
- manufacturers':
  - instructions for equipment use
  - recommendations for operator maintenance
- work order with specific instructions for chipping or mulching timber refuse
- template documents for recording production outcomes and equipment faults
- relevant personnel for the purposes of communicating information
- organisational procedures for chipping and mulching timber refuse.

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessor requirements

Assessors must:

- hold the appropriate assessor competency standards as outlined in regulations; and
- be able to demonstrate vocational competencies at least to the level being assessed; and
- be able to demonstrate how they are continuing to develop their VET knowledge and skills as well as maintaining their industry currency and assessor competence
-

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Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=0d96fe23-5747-4c01-9d6f-3509ff8d3d47

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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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ICTCBL208 Splice and terminate optical fibre cable for carriers and service providers

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 splice and terminate optical fibre cable within an optical telecommunications transmission environment for new installations or upgrades of an optical backbone or access network, to achieve greater bandwidth and capacity required by emerging technology convergence for next generation networks (NGN).

It applies to technical staff who splice and terminate optical fibre cable for telecommunications projects for commercial or industrial fibre to the premises (FTTP) non-mechanical splicing installations.

All client cabling work in the telecommunications, fire, security and data industries must be performed by a registered cabler. All cablers are required to register with an Australian Communications and Media Authority (ACMA) accredited registrar.

Unit Sector

Telecommunications – cabling

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 splicing	1.1 Select safety equipment to protect self and public according to enterprise guidelines and work health and safety (WHS) practices 1.2 Confirm layout of installation according to physical conditions at site and relevant legislation, codes, regulations and standards

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ELEMENT	PERFORMANCE CRITERIA
	1.3 Inform appropriate personnel of identified hazards on worksite 1.4 Locate other services from relevant authorities according to enterprise guidelines and safe practices 1.5 Test for dangerous gases and place guards around open manholes following WHS and environmental requirements 1.6 Obtain approval for alterations to design according to enterprise guidelines
2. Check existing optical fibre cable	2.1 Verify that cable was installed according to installation plan and visually inspect cable for signs of sheath damage 2.2 Maintain minimum bend ratios according to manufacturer's specifications to prevent cable damage and signal degradation 2.3 Secure cable according to safe industry practice to avoid cable and sheath damage
3. Splice optical fibre cable	3.1 Verify fibre is not live using appropriate equipment to maintain safe working practice and ensure correct fibre has been identified 3.2 Prepare cable end to expose optical fibres according to splicing method and manufacturer's specifications 3.3 Prepare and splice fibres using safe industry practice according to enterprise specifications 3.4 Test splice joint to manufacturer's and design requirements
4. Terminate optical fibre cable	4.1 Select connector unit to suit terminating frame according to design specifications 4.2 Terminate cable using type of termination specified in plan and according to manufacturer's specifications 4.3 Test termination for transmission loss and strength, and re-terminate if transmission loss exceeds manufacturer's specifications 4.4 Install protection devices on connectors to protect from exposure and contaminants 4.5 Label and lay up cables in enclosure according to manufacturer's instructions and enterprise guidelines
5. Finish job and report	5.1 Remove waste and reinstate site according to enterprise guidelines 5.2 Prepare reports, including test results and alterations to plans, according to enterprise policy 5.3 Notify appropriate personnel of work completion and obtain sign off

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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	1.1, 1.4, 2.1, 2.2, 3.2, 3.4, 4.1, 4.2, 4.5, 5.2, 5.3	• Understands familiar texts of limited complexity that may incorporate graphs, tables and charts • Recognises the structures and distinguishing features of a range of familiar text types
Writing	1.3, 1.4, 1.6, 5.2, 5.3	• Interrelates ideas and information and some support material when writing about familiar topics
Oral Communication	1.3, 1.4, 1.6, 5.3	• Demonstrates an awareness of the need to vary structure, style, tone and vocabulary to meet the requirements of the audience, context and purpose
Numeracy	2.2	• Interprets and comprehends whole numbers and familiar or routine fractions, decimals and percentages
Navigate the world of work	1.1, 1.5, 2.1, 2.3, 3.1-3.4, 4.1-4.3, 4.5, 5.1-5.3	• Takes responsibility for decisions about when and how to complete tasks and coordinate with others • 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
Get the work done	1.5, 1.6, 2.2, 3.1, 3.3, 3.4, 4.1-4.5, 5.1	• Implements actions as per plan, making slight adjustments if necessary, and addressing some unexpected issues • Initiates standard procedures when responding to familiar problems within immediate context

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
ICTCBL208 Splice and terminate optical fibre cable for	ICTCBL2065B Splice and terminate optical fibre cable for carriers	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
carriers and service providers	and service providers	Performance Criteria clarified	

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 ICTCBL208 Splice and terminate optical fibre cable for carriers and service providers

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 the ability to:

- splice, terminate and test optical fibre cable, applying safety precautions when working with laser based systems
- splice at least 12 fibres and house in industry recognised enclosures according to manufacturer's instructions
- install a mechanical splice connector (fast or quick connector)
- install a pigtail that is fusion spliced to the cable fibre
- complete relevant documentation to manufacturer's and design requirements
- provide report documenting the installation and test results to client
- comply with all related work health and safety (WHS) requirements and work practices.

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 causes of signal strength loss in optical fibre
- identify colour coding of fibres
- summarise relevant safety standards applicable to the operation of laser products
- describe the features and operating requirements of test equipment for optical fibre cable
- identify industry and organisational policies and procedures when splicing optical fibre cable
- describe the information required to operate equipment according to a test specification
- identify optical fibre equipment and summarise the manufacturer's requirement for safe operation
- describe the safety precautions when working with laser based systems

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- identify specific WHS requirements relating to the activity and site conditions, including hazardous gases
- discuss techniques for types of termination including:
  - direct termination
  - fusion splicing
- describe test methods and performance requirements
- identify types of optical cable
- state the relevant authorities that may be involved in optical fibre installations.

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 – cabling field of work and include access to:

- special purpose tools, equipment and materials
- sites where splicing and termination of optical fibre cable may be conducted
- optical fibre testing equipment currently used in industry
- relevant regulatory and equipment documentation that impacts on optical fibre cable 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 found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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ICTCBL210 Install a telecommunications service to a building

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 install a telecommunications service to a building to provide a new service or a service upgrade.

It applies to individuals who work in technical roles that require bringing a telecommunications service from the broader network to a client's premises using metallic or optical cable or wireless connection.

Work functions in the occupational areas where this unit may be used are subject to regulatory requirements. Refer to the ICT Implementation Guide Companion Volume or the relevant regulator for details of licensing, legislative or certification requirements.

Unit Sector

Telecommunications – cabling

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 service installation	1.1 Arrange access to site with client and obtain job specifications 1.2 Notify supervisor of identified safety hazards at worksite according to work health and safety (WHS) and environmental requirements 1.3 Use installation specifications to determine type of services, network cables and equipment required for installation

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ELEMENT	PERFORMANCE CRITERIA
	1.4 Select cables and equipment that comply with functionality and compatibility of existing installation 1.5 Select and obtain tools and equipment to carry out installation activity
2. Install cable and equipment to building	2.1 Locate, connect and check cables at entry into network for transmission quality and continuity where service to building exists 2.2 Install cable and equipment, and seal cable entry to building in safe manner according to installation plans and Australian Communications and Media Authority (ACMA) standards 2.3 Test overall functionality of new service to meet installation specifications 2.4 Rectify faults if required and minimise interruption to existing service in agreement with client 2.5 Install lightning protection, where required, according to enterprise guidelines and industry practice
3. Complete records and clean up site	3.1 Label cable pairs clearly to provide accurate identification according to manufacturer's, industry and client standards 3.2 Update records and plans with installation details to provide accurate record according to industry codes of practice and current Australian Standards 3.3 Remove installation waste and debris from worksite and dispose of according to environmental requirements to maintain safe worksite conditions 3.4 Complete Telecommunications Cabling Advice (TCA) forms and present to client to 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, 2.3	• Interprets textual information from relevant sources to identify relevant and key information
Writing	1.2, 3.1, 3.2, 3.4	• Uses clear, specific and industry related terminology to complete workplace documentation

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Oral Communication	1.1	• Articulates clearly using appropriate language for the environment • Uses listening and questioning techniques to confirm understanding
Numeracy	2.3	• Takes readings and measurements and interprets results
Navigate the world of work	1.2, 1.3, 2.2, 2.5, 3.1-3.4	• Complies with explicit policies, procedures and legislative requirements relevant to own role
Interact with others	1.2, 2.4, 3.4	• Identifies and follows accepted communication practices and protocols when liaising with clients, internal and external personnel on technical and operational matters
Get the work done	1.1-1.5, 2.1, 2.2, 2.5, 3.1	• Determines job sequence and works logically and systematically to undertake clearly defined tasks • Analyses task requirements to decide on appropriate equipment and practices • Applies standard diagnostic practices to identify and rectify faults

Unit Mapping Information

Code and title current version	**Code and title previous version**	**Comments**	**Equivalence status**
ICTCBL210 Install a telecommunications service to a building	ICTCBL2068A Install a telecommunications service to a building	Updated to meet Standards for Training Packages Performance Criteria clarified	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 ICTCBL210 Install a telecommunications service to a building

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 the ability to:

- prepare and install cable and equipment to a building complying with Australian Communications and Media Authority (ACMA), enterprise and government regulations
- conduct tests related to transmission quality and continuity of cables at network entry point
- label and document installation work, complying with industry codes of practice
- comply with all related work health and safety (WHS) requirements and work practices.

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:

- list information required to operate equipment according to a test specification
- describe features and operating requirements of test equipment
- outline legislation, codes of practice and other formal agreements that impact on the work activity
- summarise manufacturer's requirements for safe operation of equipment
- discuss WHS requirements and work practices associated with cable provision, including:
  - adequate warning signs
  - protective clothing and personal safety items
  - safety devices
- explain test methods and performance requirements
- discuss typical issues and challenges that occur on site.

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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 – cabling field of work and include access to:

- sites where telecommunications services may be installed
- installation and testing equipment currently used in industry
- relevant regulatory and equipment documentation that impacts on 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 found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2

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MEM16012A Interpret technical specifications and manuals

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers identifying, accessing, interpreting and analysing technical information in an enterprise, including quality documentation, equipment manufacturer specifications, engineering data sheets and national standards. It also covers explaining and using the information, and identifying implications of changes to technical information.

Application of the Unit

Application of the unit	This unit goes beyond routine accessing and interpretation of technical information. This unit applies to the identification, access, interpretation and analysis of technical information to enable carrying out engineering or manufacturing activities. For routine accessing, organising and communication of information related to processes or tasks, MEM16006A Organise and communicate information should be regarded as sufficient. **Band**: **B** **Unit Weight**: **4**

Licensing/Regulatory Information

Not Applicable

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Pre-Requisites

Prerequisite units	

Employability Skills Information

Employability skills	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

ELEMENT	**PERFORMANCE CRITERIA**
1. Identify and locate technical information resources	1.1. Information needs are identified and confirmed with appropriate persons. 1.2. Workplace information resources are identified and their location is determined in the information system. 1.3. Appropriate technical information is obtained.
2. Access technical information	2.1. Relevant technical information is located using search techniques appropriate to the resource and information requirements. 2.2. Symbols, codes, legends, and abbreviations are interpreted correctly. 2.3. Technical information is accessed and relevant

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ELEMENT	PERFORMANCE CRITERIA
	application is understood. 2.4. Clarification or further explanation of technical information is obtained, where required. 2.5. If applicable, the revision status of the technical information is verified to ensure current status.
3. Interpret and analyse technical information	3.1. Technical information/data appropriate to work requirements and/or application is checked for currency and authenticity. 3.2. Technical information is interpreted and analysed for use in given engineering or manufacturing applications. 3.3. Technical information is used according to the specific engineering or manufacturing application.
4. Explain and use information	4.1. Information and analyses is explained and distributed to appropriate personnel. 4.2. Information resources are used according to work requirements. 4.3. Where applicable, work is undertaken in accordance with acquired technical information.
5. Identify implications of changes to technical information	5.1. Technical information systems are monitored for changes. 5.2. Personnel affected by changes to internal or external specifications or other technical information are identified. 5.3. Means of distributing changed information are established. 5.4. Changes to technical information are documented according to enterprise procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE
This section describes the skills and knowledge required for this unit.
Required skills
Look for evidence that confirms skills in: • accessing, reading and following information on written job instructions,

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REQUIRED SKILLS AND KNOWLEDGE
specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • planning, sequencing operations • following oral/written instructions • checking and clarifying task-related information • checking for conformance to specifications • undertaking numerical operations and calculations/formulae within the scope of this unit • entering information onto workplace documents • accessing and using technical documentation • identifying and using correct specifications for process and/or systems • using components of system, where appropriate • completing formal documentation and reporting as required • adopting appropriate communication strategy, including confirmation of received information and distribution of instructions • communicating information in ways appropriate for the audience • maintaining appropriate records • identifying and analysing implications of changes to information systems
Required knowledge
Look for evidence that confirms knowledge of: • available industry information resources • uses and applications of information resources • range of formats that information can be presented • safe work practices and procedures • location and retrieval requirements of system information • correct process used to identify relevant specifications • quality improvement processes for information systems • interpretation of technical data and information • appropriate communication strategies • dissemination of information regarding information systems • a range of instructional techniques • implications of changes to technical information • procedures for responding to information changes • hazards and control measures associated with changes to technical information, including housekeeping • safe workplace practices and procedures

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Evidence Guide

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 interpret and analyse information from specifications and manuals.
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.
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 interpreting and analysing information from specifications and manuals 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.
Guidance information for	

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EVIDENCE GUIDE	
assessment	

Range Statement

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.	
Information resources	Documented management system (manufacturing, quality, environmental, occupational health and safety), manufacturers' manuals, specifications, Australian and international standards, customer requirements, industry manuals, codes of practice, legislation etc. in hard and soft copy
Location	Reference libraries, workplace storage areas, internet, site
Information system	Internal and/or external. The system would typically have documentation tiers
Technical information	Technical information and data suitable and appropriate for advanced trade and technician applications within the enterprise. This unit does not cover documentation written for professional engineering or scientist applications
Search techniques	• Computer database and internet search/look-up • Standard techniques to identify relevant information including skimming and scanning, identifying key words/ideas, using index, table of contents, numbering and classification systems etc.
Analyses	Conclusions made from the analysis of technical information

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Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Communication

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MEM17003A Assist in the provision of on the job training

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit covers assisting in the provision of on the job training to others while undertaking normal duties.

Application of the Unit

Application of the unit	This unit may involve the replacement of normal duties with training duties for limited periods of time. The individual would not be expected to be solely responsible for the assessment or reporting of a trainee's progress. Typical applications could include the provision of on the job guidance by a tradesperson to apprentices/trainees or by a production worker to other production workers/trainees. Where development of training programs is involved see Unit MEM17001B (Assist in development and deliver training in the workplace). **Band**: **A** **Unit Weight**: **2**

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units	

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Prerequisite units	

Employability Skills Information

Employability skills	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

ELEMENT	**PERFORMANCE CRITERIA**
1. Determine role of on the job training	1.1. Objectives of training and role of on the job training are identified in consultation with team leaders or other appropriate personnel.
2. Provide on the job training	2.1. Training is conducted using learning methods appropriate to the training objectives and learner. 2.2. Trainee progress is monitored and feedback is provided appropriate to the learning outcomes.
3. Report on trainee performance	3.1. Trainee's progress is reported according to standard operating procedure.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Look for evidence that confirms skills in:

- obtaining all relevant information with respect to the training to be provided
- applying suitable training methods
- providing feedback to the trainee throughout the training process
- reporting on the trainee's progress
- reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
- planning and sequencing operations
- checking and clarifying task-related information

Required knowledge

Look for evidence that confirms knowledge of:

- training to be delivered
- personnel to be consulted with respect to the training to be provided
- the individual's role in the provision of training
- objectives of the training
- the person(s) to be trained
- procedures to be followed when training individuals
- training location(s)
- tools, equipment, procedures, materials and resources
- training delivery methods, their applications, advantages and disadvantages
- feedback techniques
- reasons for monitoring trainee progress
- reporting procedures
- hazards and control measures associated with assisting in the provision of on the job training, including housekeeping
- safe work practices and procedures

Evidence Guide

EVIDENCE GUIDE

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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 assist in the provision of on the job training.
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.
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 assisting in the provision of on the job training 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.
Guidance information for assessment	

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Range Statement

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.	
Learning methods	Explanation, demonstration, simulation
Report	Should include information about the skills satisfactorily achieved and those where further practice is required

Unit Sector(s)

Unit sector	

Co-requisite units

Co-requisite units		

Competency field

Competency field	Training

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NWPGEN007 Sample and test drinking water

Modification History

Release	Comments
1	This unit was released in NWP Water Training Package release 1.0 and meets the Standards for Training Packages. • New unit • Created drawing upon information from deleted units NWP208A and NWP218B

Application

This unit describes the skills required to collect and prepare drinking water samples and to perform basic water quality tests. This unit does not include off-site laboratory testing.

This unit applies to those working in field operations in the water industry, but might be relevant to others.

The skills and knowledge described in this unit must be applied within the legislative, regulatory and policy environment in which they are carried out. Organisational policies and procedures must be consulted and adhered to.

Those undertaking this unit would work under supervision, while performing routine tasks in a range of familiar contexts.

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

Competency Field

General

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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. Where bold italicised text is used, further information is detailed in the range of conditions section.
1. Prepare for water quality sampling and testing	1.1 Receive instructions for taking samples and conducting basic water quality tests. 1.2 Confirm and record samples and tests to comply with requirements. 1.3 Select, check and prepare equipment and resources. 1.4 Select and apply relevant sample preservation methods. 1.5 Select, fit and use personal protective equipment.
2. Conduct water quality sampling and testing	2.1 Adopt hygienic work practices. 2.2 Collect samples ensuring that types, locations and times comply with requirements. 2.3 Prepare samples for off-site laboratory testing according to requirements. 2.4 Maintain integrity of samples during sampling and on-site testing. 2.5 Conduct basic on-site water quality tests. 2.6 Assess and report abnormal characteristics and apply incident management principles. 2.7 Record samples and results of on-site analysis. 2.8 Limit hazards and contamination to self, work area and environment.
3. Finalise work	3.1 Apply chain of custody principles. 3.2 Report observations or measurements requiring further action. 3.3 Dispose of samples and clean and store test equipment. 3.4 Clear and restore work area.

Foundation Skills

The foundation skills demands of this unit have been mapped for alignment with the Australian Core Skills Framework (ACSF). The following tables outline the performance levels indicated for successful attainment of the unit.

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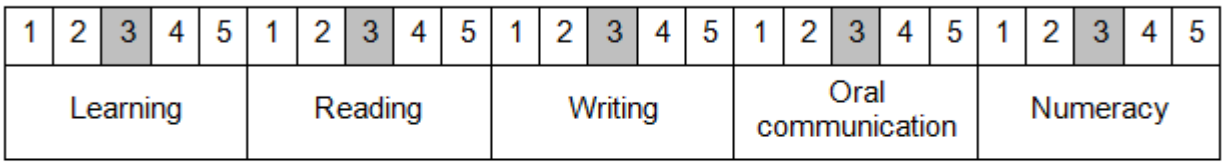
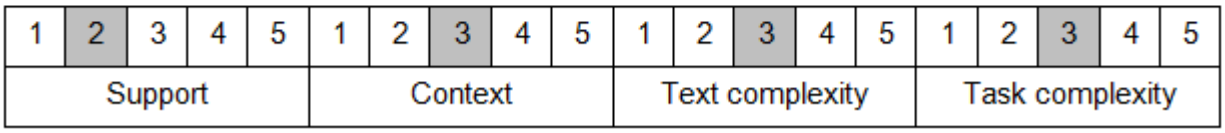
ACSF levels indicative of performance:



Performance variables:



Further information on ACSF and the foundation skills underpinning this unit can be found in the Foundation Skills Guide on the GSA website.

Range of Conditions

Types of sampling conditions includes:	• physical • microbial • chemical • radiological
On-site tests include:	• turbidity • pH • dissolved oxygen • electrical conductivity • chlorine • temperature • colour
Types of sampling areas include:	• surface • ground • drinking • seawater

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=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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Assessment Requirements for NWPGEN007 Sample and test drinking water

Modification History

Release	Comments
1	These Assessment Requirements were released in NWP Water Training Package release 1.0 and meet the Standards for Training Packages.

Performance Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. To be deemed competent the candidate must be assessed in a minimum of three of the types of tests, one of the types of conditions and one of the areas of sampling listed in the Range of Conditions. If not otherwise specified the candidate must demonstrate evidence of performance of the following on at least one occasion.

- calibrating testing equipment
- interpreting sampling and testing requirements
- preparing, checking and using equipment
- assessing risks
- preparing, collecting, labelling and preserving water samples
- disposing of waste and spent samples
- planning and preparing for water sampling tasks
- recording all required information

Knowledge Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. If not otherwise specified the depth of knowledge demonstrated must be appropriate to the job context of the candidate.

- chain of custody
- range and purpose of basic water quality testing and sampling
- relevant policies and procedures
- blind sampling
- abnormal characteristics of water samples
- atypical test result data
- relevant work-related calculations
- maintenance and storage of reagents
- requirements for maintaining sample integrity

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- relevant legislative and organisational requirements
- water sample preparation
- work planning processes
- effects of weather and conditions on work
- hazards associated with collection of water samples
- incident management principles

Assessment Conditions

Competency should be assessed in an actual workplace or in a simulated environment, with access to equipment and infrastructure appropriate to the outcome. Competency should be demonstrated over time to ensure the candidate is assessed across a variety of situations.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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NWPTRT001 Operate and control water treatment processes

Modification History

Release	Comments
1	This unit was released in NWP Water Training Package release 1.0 and meets the Standards for Training Packages. • New unit, created drawing upon information from deleted units NWP260A, NWP261A and NWP345B

Application

This unit of competency describes the skills required to operate and control a water treatment plant, to report on water treatment plant system performance and process quality control. The ability to operate water treatment processes in urban and/or rural areas, in compliance with relevant water legislation and regulations and Australian Drinking Water Guidelines, is vital to performance.

This unit applies to those working as operational staff in water treatment plants with responsibility for the practical and safe operation of plant, equipment and processes.

The skills and knowledge described in this unit must be applied within the legislative, statutory, regulatory and policy environment in which they are carried out. Organisational policies and procedures must be consulted and adhered to.

Those undertaking this unit would work under supervision, while performing routine tasks, within a familiar context.

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

Competency Field

Treatment

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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. Where bold italicised text is used, further information is detailed in the range of conditions section.
1. Plan and prepare for work	1.1 Determine work requirements from job specifications and plans. 1.2 Select and check equipment to meet safety requirements of task and site. 1.3 Select, fit and use safety equipment including personal protective equipment.
2. Operate and control process	2.1 Carry out routine plant inspections according to the type of plant. 2.2 Identify and report process faults and the operational condition of the plant. 2.3 Collect samples and conduct standard tests. 2.4 Carry out basic adjustments to improve process performance.
3. Complete documentation	3.1 Collect, interpret, record and complete process data. 3.2 Identify data that falls outside normal parameters and report for further action.

Foundation Skills

The foundation skills demands of this unit have been mapped for alignment with the Australian Core Skills Framework (ACSF). The following tables outline the performance levels indicated for successful attainment of the unit.

ACSF levels indicative of performance:

1	2	**3**	4	5	1	2	**3**	4	5	1	2	**3**	4	5	1	**2**	3	4	5	1	2	3	**4**	5
Learning					Reading					Writing					Oral communication					Numeracy					

Performance variables:

1	**2**	3	4	5	1	**2**	3	4	5	1	2	**3**	4	5	1	2	**3**	4	5
Support					Context					Text complexity					Task complexity				

Further information on ACSF and the foundation skills underpinning this unit can be found in the Foundation Skills Guide on the GSA website.

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Range of Conditions

Current processes include:	• pre-treatment
	  • chemical dosing
	  • coagulation
	  • pH adjustment
	  • iron manganese
	  • pre-screening
	• separation
	  • clarification
	  • filtration
	  • DAF
	• disinfection
	• post-treatment
	  • fluoride
	  • ozone
	  • BAC
	  • stabilisation

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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Assessment Requirements for NWPTRT001 Operate and control water treatment processes

Modification History

Release	Comments
1	These Assessment Requirements were released in NWP Water Training Package release 1.0 and meet the Standards for Training Packages.

Performance Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. The candidate must be assessed operating at least two of the processes listed in the Range of Conditions, of which one must be from separation and one from disinfection. If not otherwise specified the candidate must demonstrate evidence of performance of the following on at least one occasion.

- conducting routine plant inspections
- interpreting safety data sheets (SDS)
- applying basic mathematical formulae
- completing logs
- preparing and applying chemical dosing including at least one of:
  - pH adjustment
  - coagulants
  - polymers
  - flocculants
  - disinfectants
  - fluoride
- interpreting plans, charts and instructions

Knowledge Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. If not otherwise specified the depth of knowledge demonstrated must be appropriate to the job context of the candidate.

- water cycle
- sources of water
- demands and uses of water, both domestic and industrial
- physical, chemical and microbiological characteristics of water within the water treatment process

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- reasons for water treatment
- types of treatment plants and processes
- major chemicals and equipment used
- water treatment plant hazards
- risk factors and potential hazards associated with the operation of water treatment processes
- physical, chemical and microbiological characteristics of water within the water treatment process
- chemical and biological principles that form the basis of water treatment
- types of components
- relevant technologies
- water quality principles
- relevant guidelines and standards
- risk management principles of water treatment (HACCP)
- basic knowledge of types of chemicals and water chemistry

Candidate should demonstrate basic knowledge of all processes listed in Range of Conditions.

Assessment Conditions

Competency should be assessed in an actual workplace or in a simulated environment, with access to equipment and infrastructure appropriate to the outcome. Competency should be demonstrated over time to ensure the candidate is assessed across a variety of situations.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037

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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

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 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

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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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

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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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

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 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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TLID3035 Operate a boom type elevating work platform

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 operate a boom type elevating work platform less than 11 metres boom length, in accordance with relevant state/territory licence/permit requirements and regulations, in a variety of operational contexts.

It includes inspecting and testing elevating work platform, assessing job and work requirements, planning work and setting up for lift, and carrying out elevation. It also includes implementing planned hazard controls and strategies, and packing up work platform after operations.

Work is performed with limited supervision, and with duty of care responsibility for self and others in achieving the prescribed outcomes.

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

Pre-requisite Unit

Not applicable.

Competency Field

D – Load Handling

Unit Sector

Not applicable.

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the	Performance criteria describe the performance needed to

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essential outcomes.	demonstrate achievement of the element.
1 Inspect and test elevating work platform	1.1 Work platform is visually inspected prior to operation for evidence of damage, structural weakness or interference in accordance with pre-operational safety check procedures
	1.2 Routine pre-operational equipment checks are carried out in accordance with available checklists
	1.3 Work platform logbook is checked, service requirements are noted and maintenance personnel are advised of requirements
	1.4 Elevating work platform is started in accordance with manufacturer guidelines and start-up procedures for operations, and abnormal noise or movement is reported to authorised person for corrective action
	1.5 Start-up checks are conducted in accordance with manufacturer specifications and company procedures to ensure work platform and equipment are operating correctly
	1.6 Faults are corrected or reported to authorised person for corrective action in accordance with company procedures
	1.7 Operating and emergency controls are checked for correct operation in accordance with manufacturer specifications, including use of emergency decent device
	1.8 Boom is lowered under simulated emergency conditions to check for operational effectiveness
	1.9 Gear and accessories are checked and damaged or worn gear is segregated and reported to authorised person for testing/repair/destruction
	1.10 Results of inspections are recorded and reported in accordance with company procedures
2 Assess job requirements and work	2.1 Briefing, handover details, authorisations and clearances are received, interpreted and clarified in accordance with company and site procedures, and legislative requirements
	2.2 Work area is inspected, potential hazards are identified and appropriate elimination or control measures are selected
	2.3 Weight of load including personnel and equipment, is correctly estimated to ensure job is within limits of work platform capacity

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3	**Plan work and set up for lift**	3.1 Work plan is developed and agreed with relevant workplace personnel, including hazard prevention/control measures, and safety and emergency procedures in line with applicable Australian Standards
		3.2 Suitable firm and level standing is chosen and prepared for location of elevating work platform
		3.3 Outriggers and stabilisers are correctly deployed and positioned in accordance with manufacturer instructions and appropriate Australian Standards
		3.4 Appropriate plates or packing are correctly used under footplates as required to adequately distribute loading
		3.5 Ground is checked before and after packing is installed to ensure it is firm enough to bear load
		3.6 Job plan is developed including hazard prevention/control measures and safety procedures in accordance with applicable Australian Standards and equipment manufacturer specifications
		3.7 Work platform load chart is located and information on permissible loads, radii and heights is taken into account in planning job
		3.8 Job requirements, and workplace rules and procedures are taken into account in job plan
		3.9 Job plan is discussed and confirmed with relevant personnel
		3.10 Work gear and tools are properly stowed in elevating work platform in accordance with Australian Standards, company procedures and guides
4	**Carry out elevation**	4.1 Configuration and operation of elevating work platform are checked as required to ensure safe lift
		4.2 Operation of work platform is carried out in accordance with job plan, appropriate Australian Standard and manufacturer specifications
5	**Implement planned hazard control strategies**	5.1 Load is constantly monitored to ensure safety of personnel, load and structural stability
		5.2 Unplanned situations are responded to in accordance with company procedures, in a manner that minimises risk to personnel and equipment

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	5.3	Required signals are correctly given, interpreted and followed in accordance with appropriate Australian Standards
6 Pack up work platform	6.1	Elevating work platform is shut down using correct sequence of procedures in accordance with manufacturer instructions
	6.2	Routine post-operational equipment checks are carried out in accordance with manufacturer instructions and available checklists, and defects are recorded and reported in accordance with company procedures
	6.3	Elevating work platform is dismantled in accordance with job plan, manufacturer instructions and relevant statutory regulations
	6.4	Outriggers and stabilisers are secured and stowed in accordance with manufacturer instructions
	6.5	Elevating work platform is correctly stowed and secured in accordance with manufacturer instructions and company procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit 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 TLID3035A Operate a boom type elevating work platform.

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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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Assessment Requirements for TLID3035 Operate a boom type elevating work platform

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 one occasion and include:

- applying precautions and required action to minimise, control or eliminate identified hazards
- applying relevant legislation and workplace procedures
- communicating effectively with others
- completing relevant documentation
- identifying and correctly using equipment, processes and procedures
- implementing contingency plans
- interpreting and following operational instructions
- modifying activities depending on operational contingencies, risk situations and environments
- monitoring performance of equipment
- monitoring work activities in terms of planned schedule
- operating and adapting to differences in equipment in accordance with workplace operating procedures
- planning own work, predicting consequences and identifying improvements
- reading and interpreting relevant instructions, procedures, regulations, codes of practice and manuals
- reporting and/or rectifying identified problems, faults or malfunctions promptly, in accordance with regulatory requirements and workplace procedures
- selecting and using required personal protective equipment conforming to industry and work health and safety (WHS)/occupational health and safety (OHS) standards
- servicing equipment in terms of maintenance schedule and workplace operating procedures
- working collaboratively with others
- working systematically with required attention to detail without injury to self or others, or damage to goods or equipment.

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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:

- boom type elevating work platform applications, capacities, configurations, safety hazards and control mechanisms
- capability on boom type elevating work platform compliance plate
- operational work systems and equipment
- problems that may arise when operating a boom type elevating work platform and actions that should be taken to prevent or solve these problems
- relevant road rules, regulations, permit and licence requirements for boom type elevating work platform operation
- relevant WHS/OHS and environmental procedures and regulations
- risks and hazards involved in operating a boom type elevating work platform and associated action that can be taken to eliminate or minimise the risk/hazards concerned
- wind speed equipment capability (wind loading)
- workplace procedures for operating a boom type elevating work platform less than 11 metres boom length, at a worksite.

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 include:

- a range of relevant exercises, case studies and/or simulations
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- relevant materials, tools, equipment and personal protective equipment currently used in industry.

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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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TLIF2010 Apply fatigue management strategies

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 apply fatigue management strategies within the transport and logistics industry. Work is undertaken in compliance with relevant legislation, regulations, codes and guidelines.

It includes identifying and acting on signs of fatigue and implementing appropriate strategies to minimise fatigue during work activities, in particular when operating equipment, trains, vehicles, load shifting equipment, marine vessels and aircraft.

Work is performed under some supervision generally within a team environment.

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

Pre-requisite Unit

Not applicable.

Competency Field

F – Safety Management

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 Identify and act on signs of fatigue	1.1 Potential causes of fatigue are identified and action is taken to minimise their effects in accordance with company procedures

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	1.2 Personal warning signs of fatigue are recognised and necessary steps are taken in accordance with workplace procedures, to ensure that effective work capability and alertness are maintained
2 Implement strategies to minimise fatigue	2.1 Workplace procedures are assessed to minimise fatigue
	2.2 Factors that increase the risk of fatigue-related accidents and incidents are minimised
	2.3 Fatigue management strategies are implemented in accordance with workplace policy
	2.4 Lifestyle choices are made that promote the effective long-term management of fatigue
	2.5 Effective practices in combating fatigue are adopted and applied
	2.6 Personal fatigue management strategies are communicated to relevant people
	2.7 Appropriate counter measures are planned to combat fatigue

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit 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 TLIF2010A Apply fatigue management strategies.

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Assessment Requirements for TLIF2010 Apply fatigue management strategies

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 one occasion and include:

- adapting to changes in rosters and standard operating procedures as they relate to fatigue management
- adjusting lifestyle patterns to ensure effective fatigue management during work activities
- applying precautions and required action to minimise and control the effects of fatigue when carrying out own work functions
- applying relevant legislation and workplace procedures
- communicating effectively with others when applying fatigue management strategies
- identifying and meeting own learning needs about fatigue management related matters
- modifying activities and taking appropriate initiatives to manage fatigue in the workplace depending on work contexts, risk situations and environments
- reading and interpreting instructions, procedures, regulations and signs related to fatigue management and applying them to work activities
- recognising symptoms of fatigue and taking appropriate action in accordance with fatigue management regulations and workplace procedures
- working collaboratively with others to manage and minimise the effects of fatigue during 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:

- causes and effects of fatigue on workers
- factors that increase fatigue-related accidents
- how fatigue affects workplace performance

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- how fatigue contributes to workplace accidents
- lifestyles that promote effective long-term fatigue management
- relevant fatigue management codes, regulations, permit and licence requirements
- relevant work health and safety (WHS)/occupational health and safety (OHS) regulations as they relate to fatigue
- risks and hazards created by workplace fatigue
- sources of information on fatigue
- strategies and ways of managing fatigue
- ways of recognising fatigue
- workplace policies and procedures related to fatigue management and the control of factors that can contribute to fatigue and fatigue-related accidents.

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 include:

- a range of relevant exercises, case studies and/or other simulation
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals.
-

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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TLIF3063 Administer the implementation of fatigue management strategies

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 administer the implementation of fatigue management strategies during work operations in a defined workplace in accordance with national and state/territory legislation and relevant regulations.

It includes monitoring the implementation of fatigue management strategies, recognising breaches of fatigue management policies, procedures and regulations, and developing and assessing staff competence in fatigue management.

It also includes providing feedback to staff on shortcomings in their fatigue management skills and knowledge, and reporting to management on the implementation of fatigue management policy.

Work is performed under limited supervision generally as a team leader or supervisor.

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

Pre-requisite Unit

Not applicable.

Competency Field

F – Safety Management

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 Monitor the implementation of fatigue management strategies	1.1 Work activities of employees, subcontractors and suppliers in organisation's products and services supply chain are monitored in accordance with organisation's fatigue risk management implementation plan
	1.2 Reviews are undertaken of scheduled versus actual hours of work and where a compliance breach is identified, appropriate action is taken to analyse the reasons concerned and to rectify the situation
2 Recognise breaches of fatigue management policies, procedures and regulations	2.1 Signs and symptoms of fatigue in employees are identified in accordance with operational procedures
	2.2 Breaches of fatigue management policies, procedures and regulations in the work activities of employees, subcontractors and suppliers are recognised and reported in accordance with standard procedures
	2.3 Errors and incidents traceable to non-compliance with fatigue management procedures and regulations are investigated and reported in accordance with operational procedures
	2.4 Appropriate action is taken in conjunction with employees, subcontractors or suppliers concerned, to ensure ongoing and future compliance with the organisation's fatigue management policy and procedures
3 Develop and assess staff competence in fatigue management	3.1 Appropriate training programs and learning resources are developed and provided to ensure employees understand the organisation's fatigue management policies and procedures, and the risks, causes and consequences of fatigue
	3.2 Employees are assessed to confirm they are competent in understanding the organisation's fatigue management strategies and can apply them to their day-to-day work activities and responsibilities
	3.3 Deficiencies in employee competence to apply organisation's fatigue management strategies to their work activities are identified, and appropriate learning opportunities are provided to enable employees to achieve required competence

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4 Provide feedback to staff on shortcomings in fatigue management skills and knowledge	4.1 Evidence of employee shortcomings in implementing fatigue management strategies is obtained and interpreted from observation of signs and symptoms of fatigue in work activities, periodic evaluations of work performance, and assessments of competence carried out as part of training and learning activities
	4.2 Employees are provided with feedback on identified shortcomings in their implementation of fatigue management strategies, and appropriate support and counselling is provided on how they might address these shortcomings
	4.3 Further learning opportunities and information are provided to assist employees implement organisation's fatigue management strategies in their area of work activity, as required
5 Report on the implementation of fatigue management policy	5.1 Periodic audits of the implementation of fatigue management strategies in the work area/s of responsibility are carried out in accordance with standard procedures
	5.2 Accidents and safety incidents are investigated and analysed to identify the extent to which fatigue might have been a contributing factor
	5.3 Reports on implementation of organisation's fatigue risk management system are prepared and submitted to designated personnel in accordance with standard procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit 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.

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Unit Mapping Information

This unit replaces and is equivalent to TLIF3063A Administer the implementation of fatigue management strategies.

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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Assessment Requirements for TLIF3063 Administer the implementation of fatigue management strategies

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 one occasion and include:

- adapting to changes in relevant regulations, policies and procedures
- applying relevant legislation and workplace procedures
- assisting employees to identify their own learning needs on matters related to fatigue management
- communicating effectively with others
- modifying activities and taking appropriate initiatives to administer the implementation of organisation's fatigue risk management system depending on contexts, risk situations and environments
- planning and carrying out audits and reviews of organisation's fatigue risk management system
- planning and organising training and learning opportunities for employees on fatigue management and implementing organisation's fatigue risk management system
- reading and interpreting documentation on organisation's fatigue risk management system and related policy, instructions, procedures and regulations and applying this information to supervisory activities
- recognising breaches of fatigue management strategies and regulations and taking appropriate action in accordance with organisation's fatigue risk management system
- working collaboratively with employees and other management staff to implement organisation's fatigue risk management 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:

- causes and consequences of fatigue in relation to employees and organisation
- employee and organisation responsibilities for implementing fatigue management

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regulations and policies including suppliers and sub-contractors in organisation's services and products supply chain
- factors that increase fatigue-related accidents
- hazards and risks created by fatigue in the workplace
- how fatigue affects workplace performance
- how fatigue contributes to workplace accidents
- lifestyles that promote the effective long-term management of fatigue
- options and resources for providing training and learning opportunities for employees on fatigue management and the implementation of organisation's fatigue risk management system, including initial induction training, in-depth training on fatigue and fatigue management techniques, remedial training where existing competence is assessed as being insufficient and fatigue management refresher training
- organisation's fatigue risk management system and the workplace policies and procedures related to fatigue management, and the control of factors that can contribute to fatigue and fatigue-related accidents
- organisation's fatigue risk management system as it relates to the operational area/s being administered
- procedures for auditing and reviewing organisation's fatigue risk management system, and related policy and procedures for reporting audit outcomes
- processes and resources for assessing employee fatigue management competence
- relevant codes, regulations, permit and licence requirements
- relevant work health and safety (WHS)/occupational health and safety (OHS) regulations
- strategies and ways of managing fatigue
- ways of assisting individuals to assess their own sleep patterns and to evaluate their own fitness for work such as providing information on how to identify sleep disorders and how to obtain appropriate treatment
- ways of providing feedback to employees on identified deficiencies in their competence to implement fatigue management strategies
- ways of recognising fatigue.

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.

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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 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, codes of practice and operation manuals.

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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TLILIC0002 Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)

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 specifies the skills and knowledge required to safely operate a vehicle loading crane with a Maximum Rated Capacity (MRC) of 10 metre tonnes or more. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

Vehicle loading crane means a crane mounted on a vehicle for loading and unloading the vehicle.

A person undertaking this unit must hold:

- a current National High-Risk Work Licence (HRWL) to perform dogging or a certification for a specific VET course for HRWL to perform dogging.

A person performing this work is required to hold a vehicle loading crane HRWL.

This unit requires a person operating a slewing vehicle loading crane with an MRC of 10 metre tonnes or more 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 a lift plan is confirmed with associated personnel and a site inspection is conducted in accordance with workplace procedures
	1.2 Work area operating surface is confirmed to determine the quality of ground suitability for operational use of vehicle loading crane in accordance with workplace procedures
	1.3 Vehicle loading crane rated capacity (RC) and the lifting gear Working Load Limit (WLL) are established for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the vehicle loading crane and moving and placing load/s in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard identification and risk elimination/control measures are applied and advised to associated personnel in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed and followed in accordance with workplace procedures
	1.7 Appropriate communication procedures are identified and tested with associated personnel in accordance with workplace procedures

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	1.8	All tasks are confirmed to ensure requirements for the relevant work area in accordance with workplace procedures
Prepare for work/task 2	**2.1**	Consultation with workplace personnel is established and maintained to ensure all crane and lifting operations are clear and consistent with site requirements in accordance with a lift plan and workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with the lift plan and safe work procedures
	2.3	Vehicle loading crane controls are accessed safely in accordance with manufacturer requirements and safe work procedures
	2.4	Pre-start vehicle loading crane 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
	2.5	Vehicle loading crane is set up correctly with any lifting gear as per the lift plan in accordance with relevant manufacturer requirements including load chart/s and safe work procedures
	2.6	Boom/jib and lifting gear are set up as required in accordance with specific manufacturer requirements and safe work procedures
	2.7	Vehicle loading crane is stabilised appropriately in accordance with the lift plan, relevant manufacturer requirements 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	Vehicle loading crane logbook is inspected and is correct for the crane type, is completed and signed and required rectifications have been signed off in accordance with manufacturer requirements and safe work procedures

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		2.10	Weather and work environment conditions are assessed to determine any impact on vehicle loading crane operations in accordance with manufacturer requirements and safe work procedures
3	**Perform work/task**	**3.1**	Lifts are determined within the RC of the vehicle loading crane in accordance with the load chart/s and lift plan
		3.2	Boom/jib and hook block are safely positioned over the load following directions from associated personnel in accordance with the lift plan and safe work procedures
		3.3	Lifting gear is connected to the load and used safely in accordance with the lift plan, safe work procedures and manufacturer requirements
		3.4	Test lift is carried out in accordance with dogging and safe work procedures
		3.5	Loads are transferred using relevant crane movements and tag lines as required, in accordance with lift plan and safe work procedures
		3.6	Load and crane movement is monitored constantly and crane is operated safely in accordance with lift plan and safe work procedures
		3.7	All required communication signals are correctly interpreted and followed whilst crane is operated in accordance with the lift plan and safe work procedures
		3.8	Load is lowered and landed safely in accordance with lift plan and safe work procedures
		3.9	Lifting gear is disconnected from load and crane is positioned safely and efficiently for next task in accordance with lift plan and safe work procedures
4	**Pack up**	**4.1**	Crane boom/jib, lifting gear and associated equipment is stowed and secured as required in accordance with manufacturer requirements and safe work procedures

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4.2 Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures

4.3 Stabilisers are stowed and secured in accordance with manufacturer requirements and safe work procedures

4.4 Crane is shut down and secured to prevent unauthorised access/use in accordance with safe work procedures

4.5 Plates or packing are stowed and secured in accordance with safe work procedures

4.6 Shut down crane checks are carried out in accordance with safe work procedures and manufacturer 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC0012 Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)

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 TLILIC0002 Licence to operate a vehicle loading crane (capacity 10 metre tonnes and above)

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 relevant mathematical calculations in conjunction with lift plan and load chart to determine radius requirements and relevant lifting gear to perform work/task to enable crane to be configured for load including:
  - boom
  - Stabiliser positioning
  - type of hook
- conducting and applying risk and hazard assessment strategies including:
  - confirming work area operating surface suitability based on crane and task requirements
  - dynamic loads
  - ground conditions including condition of surface and slopes
  - load swing
  - overloading
  - lifting and placing load
  - tyre pressures/track condition
  - asymmetric loads
  - overhead hazards including electric lines and service pipes
  - restricted and poorly ventilated areas
  - risk of collision with people, moving plant and fixed structures
  - adequate lighting
  - traffic including pedestrians, vehicles and other plant
  - weather conditions
- confirming and following traffic management plan procedures relevant to their role in the work area
- complying with Commonwealth, state and territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation
- communicating with other associated personnel through using appropriate worksite procedures which including:

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  - 2-way radio
  - active listening
  - demonstrating and interpreting hand signals
  - questioning to confirm understanding
  - signage
  - whistles
  - written instructions
- maintaining three points of contact whilst accessing load surface area of vehicle loading crane and ensure rungs / steps are free of hazards
- completing the pre-start check including:
  - engine / mechanical fluid level checks as required by manufacturer requirements
  - presence of correct logbook
  - evidence of damage
  - fluid leaks
  - lights work effectively
  - locating, identifying and confirming all controls
  - fire extinguisher
  - safety equipment checks
  - signage and labels to ensure they are visible and legible
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - tyres and wheels for damage/wear and correct inflation
  - updating records as required
  - visual damage or equipment faults
- identifying, isolating, and tagging out defective equipment and reporting to authorised person/s
- inputting crane configuration into crane computer as required and checking operation to accurately reflect crane configuration
- carrying out operational checks ensuring:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions are operated
  - lifting gear movements and control functions are smooth and comply with lift plan
  - hazard warning systems, safety, audible and visual warning devices are checked for to ensure they are functional including:
    - reversing beepers
    - lights
    - horns
  - start-up is in accordance with manufacturer requirements and safe work procedures
  - there are no unusual noises
  - crane control functions comply with operating requirements
- determining any defects or faults with operation of crane and reporting to relevant person/s

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- ensuring risk control measures within the work area are effective as per workplace procedures
- interpreting and confirming relevant documentation for the work task and relevant area
- monitoring load disconnection from hook is safe and ensuring no movement of controls
- applying relevant communication signals from associated personnel
- operating a vehicle loading crane of 10metre tonnes or greater configured to its rated capacity (RC) to lift and move four different loads using the main hook through an obstacle course using all crane operational controls while the load is in full view of the crane operator. Loads must consist of:
  - a load of >50% of the Rated Capacity (RC) of the crane with a boom length of >75%, and
  - a round load with a minimum diameter of 300 mm and minimum length of 3 m that requires a dogger to sling, and
  - an asymmetrical load that requires a dogger to sling, and
  - stillage containing at least ten scaffolding standards or containing a load of steel pipes of equivalent weight that requires a dogger to sling
- applying relevant crane movements including:
  - boom/jib up and down (luffing)
  - catching load swing appropriately
  - positioning and using main and auxiliary hook and lifting gear to connect to load safely
  - raise and lower hoist
  - slew boom/jib
  - telescope in and out
- positioning vehicle loading crane in relevant area for next task
- setting up and validating an exclusion zone
- positioning the vehicle loading crane for safe operation for:
  - application of the task
  - manoeuvring in the workplace
  - stability of the vehicle loading crane and the load
- recording and maintaining accurate information relating to crane operations
- reporting to relevant person/s on site risk control measures that are not in place or deficient
- shutting down a vehicle loading crane in accordance with manufacturer requirements and safe work procedures
- stabilising a vehicle loading crane for operation by:
  - correctly positioning plates or packing
  - deploying stabilisers
  - establishing correct size plates or packing in accordance with lift plan
  - levels are checked
- test-lifting load just clear of lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure:
  - slinging is correct
  - all crane equipment is functioning properly

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    - load centre of gravity is correct
    - loads of unusual shape or weight distribution are correctly slung
- test-lifting load just clear of lifting plane to allow for checks of crane computer (where fitted) to ensure:
    - load measuring equipment can be used to verify calculated weight of load
    - near capacity loads do not overload crane
- using communications signals including:
    - hoist down - hand and whistle and radio
    - hoist up - hand and whistle and radio
    - luff boom down - hand and whistle and radio
    - luff boom up - hand and whistle and radio
    - slew left - hand and whistle and radio
    - slew right - hand and whistle and radio
    - stop - hand and whistle and radio
    - telescope in - hand and whistle and 2-way radio (where manufacturer requirements allow)
    - telescope out - hand and whistle and 2-way radio (where manufacturer requirements allow)

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:

- mathematical calculations to:
    - estimate loads
    - radius requirements
    - relevant lifting gear to perform work/task
- appropriate worksite communication procedures including:
    - listening
    - hand signals
    - questioning techniques
    - signage
    - two-way radios
    - written instructions
    - whistles
- characteristics and impact of factors affecting vehicle loading crane stability whilst moving loads including:
    - overloading
    - poor load placement
    - asymmetric loads
    - tyre deflation/condition

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- crane, lifting gear load chart/s and manufacturer requirements
- lift impacting factors including:
  - centre of gravity
  - dynamic nature of load
  - flex/deflexion of load
  - length
  - radius of lift
  - weight
- set up of:
  - jib
  - fly jib (where fitted)
- hazards including:
  - pack up and crane stability, crane tipping and demolition sites
  - ground stability including ground condition, recently filled trenches and slopes
  - insufficient lighting
  - obstacles or obstruction
  - other specific hazards and dangerous materials
  - overhead hazards including:
    - electric lines
    - service pipes
    - fixed structures
    - vegetation (trees)
  - traffic including pedestrians, vehicles and other plant
  - operations on unusual, uneven or difficult terrains
- manufacturer requirements on stabiliser procedures
- manufacturer requirements and instructions on shutting down and packing up crane
- vehicle loading crane characteristics and capabilities to allow crane configuration to suit a range of loads
- relevant workplace instructions, safety information, emergency procedures
- relevant documentation requirements and procedures for recording, reporting and maintaining workplace records and information
- risk assessment management and mitigation strategies including hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)
- roles and responsibilities of duty holders as per legislative obligations of Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) requirements and safe work / workplace procedures

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- prestart and operational checks required for a vehicle loading crane
- starting procedure of crane as per manufacturer requirements
- weather bureau forecasts and environmental conditions that could impact operation including:
  - lightning
  - wind
  - water impacted ground
  - Ultra Violet (UV) exposure
- problems and appropriate response procedures to unplanned and/or unsafe situations and environmental conditions
- stability of load and avoidance of hazards using best crane practice including:
  - allowing for boom deflection
  - boom/jib as low as possible
  - carrying load near to ground surface
  - crane stability
  - gently accelerating and braking on slew/boom to minimise load swing
  - lowering load safely onto appropriate dunnage taking into consideration swing and restrictions of area
  - minimum boom/jib length
  - minimum speed
  - using handheld taglines as required
  - identification of incorrect sling of load
- workplace standards, requirements, policies and procedures for conducting operations for the vehicle loading crane
- work area suitability based on relevant ground reports including:
  - backfilled ground
  - bitumen
  - concrete
  - hard compacted soil
  - pre-contaminated soils
  - rock
  - rough uneven ground
  - soft soils

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 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.

Accredited assessors assessing for this HRWL on behalf of the regulator are responsible for ensuring candidates must have access to resources for assessment that must include access to:

- vehicle loading crane with a MRC of greater than 10 metre tonnes in safe/serviceable working order in accordance with manufacturers specifications
- appropriate loads as outlined in the performance evidence requirements
- appropriate personnel to sling and direct loads including:
  - dogger or rigger
- communications equipment including:
  - two-way radios
  - whistles
- relevant personal protective equipment (PPE)
- relevant documentation for operating a vehicle loading crane with an MRC of greater than 10 metre tonnes including:
  - approved codes of practice and guidance
  - Australian Standards
  - checklists
  - safe work operating procedures
  - relevant industry standards (where applicable)
  - logbook
  - manufacturer guidelines (instructions, specifications or checklists)
  - relevant workplace documentation

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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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

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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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TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

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 specifies the skills and knowledge required to safely operate a boom-type Elevating Work Platform (EWP) where the length of the boom is 11 metres or more in accordance with all relevant legislative requirements. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

Boom-type elevating work platform means a telescoping device, hinged device, or articulated device, or any combination of these, used to support a platform on which personnel, equipment and materials may be elevated.

A person performing this work is required to hold a boom-type elevating work platform High Risk Work Licence (HRWL).

This unit requires a person operating an EWP 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 a site inspection is completed in accordance with workplace procedures
	1.2 Work area ground/operating surface is assessed to determine suitability for operational use of EWP in accordance with manufacturer requirements and workplace procedures
	1.3 EWP capabilities are established for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the EWP and moving in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard and risk control measures are applied and advised 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

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	1.8	All work is confirmed to ensure coverage of work/task requirements for the relevant work area in accordance with workplace procedures
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 workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with workplace procedures
	2.3	Safety equipment including Personal Protective Equipment (PPE) are inspected, fitted correctly and used in accordance with manufacturer requirements and safe work procedures
	2.4	EWP is accessed in a safe manner in accordance with manufacturer requirements and safe work procedures
	2.5	Pre-start EWP checks are carried out in accordance with manufacturers requirements and safe work procedures
	2.6	EWP is started and is checked for any abnormal noises in accordance safe work procedures
	2.7	EWP is positioned correctly as per work plan in work area in accordance with relevant manufacturer requirements and safe work procedures
	2.8	EWP is stabilised appropriately in accordance with the workplan, relevant manufacturer requirements and safe work procedures
	2.9	Operational checks from base controls are carried out in accordance with relevant manufacturer requirements and safe work procedures
	2.10	All platform controls are located, identified and tested in accordance with manufacturer requirements and safe work procedures

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	2.11	All damage and defects are reported and appropriate action is taken to rectify in accordance with manufacturer requirements and safe work procedures
	2.12	EWP logbook is inspected and is correct for the EWP, is completed and signed in accordance with manufacturer requirements and safe work procedures
	2.13	Weather and work environmental conditions are assessed to determine any impact on EWP operation and positioning as per workplan in accordance with manufacturer requirements and safe work procedures
3 Perform work/task	**3.1**	Relevant hazard prevention/control measures identified are checked for implementation in accordance with safe work procedures
	3.2	EWP is safely located at point of work in work area in accordance with safe work procedures
	3.3	EWP platform is positioned for work tasks and stability and all operations are monitored constantly in accordance with safe work procedures
	3.4	Work gear and tools are stowed and secured in accordance with safe work procedures
	3.5	EWP is operated using all movements in accordance with safe work procedures and manufacturer requirements
	3.6	Unplanned and unsafe situations are responded to in accordance with safe work procedures
	3.7	All communication signals are correctly interpreted and followed whilst EWP is operated in accordance with safe work procedures
	3.8	EWP platform is accessed and egressed in accordance with safe work procedures and manufacturer requirements

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	3.9	EWP is parked, switched off and isolated appropriately in accordance with manufacturer requirements and safe work procedures
4 Pack up	**4.1**	Post-operational EWP checks are carried out in accordance with manufacturer requirements and safe work procedures
	4.2	EWP boom is retracted, lowered, stowed and secured in accordance with manufacturer requirements and safe work procedures
	4.3	Safety equipment and PPE is disconnected from platform in accordance with safe work procedures
	4.4	Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures
	4.5	Outriggers and/or stabilisers, plates or packing if fitted are stowed and secured in accordance and with manufacturer requirements and safe work procedures
	4.6	EWP is shut down in accordance with manufacturer requirements and 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 TLILIC2005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

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Assessment Requirements for TLILIC0005 Licence to operate a boom-type elevating work platform (boom length 11 metres or more)

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:

- advising relevant person/s on site in relation to the risk hazard prevention/ control strategies
- applying safe operating and best mobiling practice and procedures for an Elevating Work Platform (EWP) including all functions within the safe working rated capacity including:
  - boom/s as low as possible and fully retracted whilst travelling
  - boom/s in line with EWP where practical whilst travelling
  - EWP stability
  - gently accelerating and braking to minimise boom/s swing
  - maintaining safe operating speed in relation to the work condition
  - travelling with work platform raised to an appropriate height for the terrain and visibility in relation to direction of travel
- applying emergency procedures
- applying traffic management plan procedures relevant to their role in the work area
- carrying out pre-start checks, including visual inspection which must include:
  - battery fluid level as required by manufacturer requirements
  - checking compliance plate is relevant to the load/s being used on the EWP
  - engine / mechanical fluid level checks as required by manufacturer requirements
  - ensuring availability of correct logbook and updating records as required
  - ensuring EWP platform and attachment/s fitted in platform are secured
  - evidence of damage
  - fluid leaks
  - lights are working effectively (where fitted)
  - safety equipment checks
  - signage and labels to ensure they are visible and legible
  - structural weaknesses including paint separation or stressed welds
  - wheels and tyres for damage/correct inflation if applicable
- carrying out operational checks on EWP including:

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  - testing of all EWP safety devices
  - all controls are located, identified and tested for functionality from the base controls and platform controls
  - hazard warning systems including travel beepers and lights are functional
  - start-up is in accordance with manufacturer requirements
  - steering, transmission and brake functions comply with operating requirements
  - there are no unusual noises
- checking compliance plate and load chart for reach requirements and load suitability
- controlling and operating a boom type elevating work platform ensuring movements and control functions are safe, smooth and comply with operating requirements including:
  - any combination of the movement of the extending structures used to support a platform on which personnel, equipment and materials are elevated to perform the work task/s
  - avoidance of ground depressions
  - correctly using observer guidance of work platform, main chassis and extending structure
  - demonstrating best mobiling practice driving an EWP in forward and reverse, while maintaining visibility
  - driving applicable to conditions and moving platform and load/s safely
  - ensuring warning devices are functioning correctly
  - interpreting directional arrows correctly on platform controls during forward, reverse, left and right
  - lowering boom to its resting position
  - monitoring platform, main chassis and extending structure movement constantly ensuring safe work procedures are followed
  - raising platform and slewing within manufacturer requirements
  - raising platform to a minimum height of 11 metres or 75% of the maximum height capacity (whichever is greater)
  - stability of the EWP and the work platform
  - telescoping in and out and positioning platform to perform work task/s safely whilst at a minimum height of 75% of the maximum capacity
- conducting and applying risk/hazard assessment strategies including:
    - barricades and controls to prevent the risk of collision with people, moving vehicles and fixed structures
    - disconnected power
    - environmental conditions including:
      - wind
      - lightning
      - water impacted ground
      - rain
      - extreme heat
      - Ultra Violet (UV) exposure
    - ground conditions (surface and slopes) and assessing work area operating surface

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    - suitability based on machine and task requirements
    - insulated electric lines
    - overhead hazards including electric lines and service pipes
    - personal protective equipment (PPE)
    - restricted areas and crush points from work platform and external surroundings
    - safety related tags on electrical switches/isolators that have an impact on point of work of EWP operator
    - sufficient lighting
    - suitable area for set-up, positioning and safely operating EWP
    - suitable firm and stable operating surface
    - use of safety observer when visibility is restricted
- clarifying workplan and checking understanding
- complying with Commonwealth, State and Territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation and regulations
- inspecting and using relevant safety equipment, including:
    - anchor point/s
    - emergency retrieval system from base controls and platform controls where fitted
    - energy absorber/s
    - lanyard/s
    - safety harness/es
- identifying, isolating and tagging out defective equipment and reporting to authorised person/s
- interpreting and confirming relevant documentation, workplace instructions, safety information and emergency procedures for the work task and relevant area
- interpreting workplace procedures in relation to various work environmental conditions
- maintaining communication with other workplace personnel using appropriate workplace procedures including procedures to ensure all movements are conveyed clearly and succinctly including:
    - 2-way radio
    - audible and visual warning devices
    - making and interpreting hand signals
    - questioning to confirm understanding
    - signage
    - written instructions
- entering work platform correctly including:
    - lowering platform safely and stably to appropriate height to access safely
    - unclipping of fall restraint/arrest device
    - maintaining three points of contact whilst accessing platform
- exiting work platform correctly including:
    - lowering platform safely and stably to appropriate height to egress safely

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    - unclipping of fall restraint/arrest device
    - exiting platform maintaining three points of contact
- recording and maintaining accurate information relating to EWP operations
- using and interpreting EWP manufacturer requirements and data, including compliance plate and load chart, to enable correct EWP selection for task including:
    - boom/s
    - jib
    - platform
    - weight including:
        - outrigger load or wheel load
- reporting to relevant person/s on site risk control measures that are not in place or deficient
- stabilising procedures for an EWP including:
    - checking levels
    - removing obstacles and obstructions
    - deploying and retracting outriggers
    - establishing correct size plates for packing (if required)
- shutting down a boom type EWP 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:

- Australian and industry standards, codes of practice and guidelines to safely operate an EWP (boom length 11 metres or more) including:
    - nominal reach, measured horizontally from centre point of rotation to outer edge of platform in its most extended position
    - vertical distance from floor of platform to surface supporting elevating work platform with platform at its maximum height
- appropriate mathematical calculations to estimate loads ensuring EWP is not overloaded
- appropriate worksite communication procedures including:
    - 2-way radio
    - audible and visual warning devices
    - questioning techniques
    - signage
    - hand signals
    - traffic warning systems
    - written instructions
- compliance with permit condition requirements including:
    - from electrical supply authority
    - if operating on roads or footpaths

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- EWP characteristics and capabilities, manufacturer requirements and instructions
- hazards including:
  - all ground and /or operating surface hazards
  - traffic including pedestrians, vehicles, other mobile plant and building structures
  - overhead hazards including electric lines, service pipes, doorways, roof beams, and lights
  - obstacles or obstructions
  - insufficient lighting
  - other relevant hazards
- impact of the following on the operation of the EWP including:
  - failure/loss of control including brakes and steering
  - failure of equipment including hydraulic system
  - EWP and platform instability due to:
    - deterioration of ground/operating surface condition
    - gradient of operating surface
    - overloading
    - poor load placement
    - irregular loads
  - emergency procedures and safety equipment, including the use of:
    - safety harness/es
    - energy absorbers
    - lanyard/s
    - anchor point/s
    - emergency retrieval systems
- identification and avoidance of person/s potential crush or entrapment points
- identification and avoidance of potential contact with overhead electrical conductor's
- identification and avoidance of potential contact with structures near work platform/boom or chassis
- relevant manufacturer requirements and instructions
- problems, and appropriate response procedures to unplanned and/or unsafe environmental conditions
- relevant procedures for refuelling/recharging EWP using appropriate PPE
- 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)
- procedures for shutting down a boom type EWP in accordance with manufacturer requirements

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- problems and equipment faults, and implementing appropriate response procedures to unplanned and/or unsafe situations
- relevant documentation requirements
- suitability and lifting capability of the EWP to be used
- lock out and tag out procedures
- traffic management plan procedures and requirements
- typical routine problems encountered operating a EWP and adjustments required for correction
- wind speed factors that affect stability of EWP as per manufacturer requirements
- 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 and Health (OSH) and codes of practice requirements for boom type elevating work platforms

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:

- appropriate boom-type elevating work platform (boom length 11 metres or more) in a

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safe/serviceable condition in accordance with manufacturer requirements
- relevant and appropriate materials, tools, equipment and personal protective equipment currently used in industry
- applicable documentation including:
  - approved codes of practice and guidance material
  - relevant Australian technical standards
  - manufacturer guidelines (instructions, requirements or checklists) for performance assessment
  - relevant industry standards and operating procedures (where applicable)
  - relevant workplace documentation.

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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TLILIC0006 Licence to operate a bridge and gantry crane

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 specifies the skills and knowledge required to operate bridge cranes and gantry cranes safely. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

A person undertaking this unit must hold:

- a current National High-Risk Work Licence (HRWL) to perform dogging or a certification for a specific VET course for HRWL to perform dogging

Bridge crane means a crane that:

- consists of a bridge beam or beams, that are mounted to end carriages at each end, and
- can travel along elevated runways, and
- has 1 or more hoisting mechanisms arranged to traverse across the bridge.

Gantry crane means a crane that:

- consists of a bridge beam or beams supported at one or both ends by legs mounted to end carriages, and
- can travel on supporting surfaces or deck levels, whether fixed or not, and
- has a crab with 1 or more hoisting units arranged to travel across the bridge

This unit applies to the activities of a person operating bridge crane or gantry crane that is:

- controlled from a permanent cabin or control station on the crane, or
- remotely controlled and having more than 3 powered operations

A person performing this work is required to hold a bridge and gantry crane HRWL.

This unit requires a person operating a bridge crane or gantry crane 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.

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Pre-requisite Unit

Not applicable

Competency Field

LIC - Licencing Units

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 a lift plan is confirmed with associated personnel and site inspection in accordance with workplace procedures
	1.2 Working area is inspected and appropriate paths for operating the bridge and gantry crane and moving/placing load/s in work area are assessed and determined in accordance with workplace procedures
	1.3 Work area operating surface is assessed to determine the quality of ground suitability for operational gantry crane in accordance workplace procedures
	1.4 Bridge and gantry crane Rated Capacity (RC) and lifting gear Working Load Limit (WLL) are established for the load/s and work/task requirements in accordance with manufacturer specifications and workplace procedures
	1.5 Relevant hazard identification and risk elimination/control measures are applied and advised to relevant person/s in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed and followed in accordance with workplace procedures

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	1.7	Appropriate communication procedures are identified, tested with associated personnel in accordance workplace procedures
	1.8	All tasks are confirmed to ensure requirements for the relevant work area in accordance with workplace procedures
2 Prepare for work/task	**2.1**	Consultation with workplace personnel is established and maintained to ensure all crane and lifting operations are clear and consistent with site requirements in accordance with a lift plan and workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with the lift plan and safe work procedures
	2.3	Bridge and gantry crane is accessed safely in accordance with manufacturer specifications and safe work procedures
	2.4	Pre-start bridge and gantry crane 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 specifications
	2.5	Bridge and gantry crane is set up and rigged correctly with any lifting gear as per lift plan in accordance with relevant manufacturer specifications including load chart/s and safe work procedures
	2.6	Operational checks are carried out and any damage and defects are reported, recorded and appropriate action is taken in accordance with manufacturer specifications and safe work procedures
	2.7	All controls are located, identified and tested in accordance with relevant manufacturer specifications and safe work procedures
	2.8	Crane logbook is inspected and is correct for the crane and type and required rectifications have been signed off in accordance with manufacturer requirements and safe work procedures
	2.9	Weather and work environment conditions are assessed to determine any impact on bridge and gantry crane operations in accordance with manufacturer requirements and safe work procedures

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3 Perform work/task	**3.1**	Lifts are determined within the RC of the bridge and gantry crane in accordance with load chart/s and lift plan
	3.2	Hook block is safely positioned over the load in accordance with safe work procedures and if crane is controlled from cabin following directions from associated personnel
	3.3	Lifting gear is connected to load and used safely in accordance with the lift plan and safe work procedures
	3.4	Test lift is carried out in accordance with dogging and safe work procedures
	3.5	Loads are transferred using relevant bridge and gantry crane movements and tag lines as required, in accordance with lift plan and safe work procedures
	3.6	Load and bridge and gantry crane movement is monitored constantly and operated safely in accordance with lift plan and safe work procedures
	3.7	All required communications signals are correctly interpreted and followed whilst crane is operated in accordance with safe work procedures
	3.8	Load is lowered and landed safely in accordance with lift plan and safe work procedures
	3.9	Lifting gear is disconnected from load and positioned safely and efficiently for next task in accordance with lift plan and safe work procedures
4 Pack up	**4.1**	Bridge and gantry crane is parked in accordance with manufacturer specifications and safe work procedures
	4.2	Bridge and gantry crane lifting gear and associated equipment is stowed and secured in accordance with safe work procedures
	4.3	Relevant motion locks and brakes are applied as required in accordance with manufacturer specifications and safe work procedures
	4.4	Bridge and gantry crane is shut down and secured to prevent unauthorised access/use in accordance with safe work procedures

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4.5 Post operational bridge and gantry crane checks are carried out in accordance with safe work procedures 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC3003 Licence to operate a bridge and gantry crane

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 TLILIC0006 Licence to operate a bridge and gantry crane

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 relevant mathematical calculations in conjunction with the rated capacity to determine relevant lifting gear to perform work/task
- applying and interpreting crane manufacturer requirements and data, including load charts, to enable crane to be configured for load
- applying relevant crane movements including:
  - catching load swing appropriately
  - positioning and using lifting attachment and lifting gear to connect to load safely
  - raise and lower hoist
- applying relevant communication signals from associated personnel
- conducting and applying risk and hazard assessment strategies including:
  - confirming work area operating surface suitability based on crane and task requirements
  - travelling surfaces are clear of debris and in serviceable condition
  - overloading
  - lifting and placing of load
  - asymmetric loads
  - overhead hazards
  - restricted and poorly ventilated areas
  - risk of collision with people, moving plant and fixed structures
  - adequate lighting
  - weather conditions
- complying with Commonwealth, state and territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation and safe work procedures
- communicating with other workplace personnel through using appropriate worksite protocols including:
  - 2-way radio
  - listening
  - making and interpreting hand signals

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  - questioning to confirm understanding
  - signage
  - verbal language
  - visual aids
  - whistles
  - written instructions
- completing the pre-start check including:
  - presence of correct logbook
  - evidence of damage
  - pendant wiring not frayed or damaged (if applicable)
  - fluid leaks
  - lights work effectively
  - locating, identifying and confirming all controls
  - emergency evacuation rescue plan in place
  - mirrors and seat are adjusted appropriately
  - safety equipment checks
  - fire extinguisher
  - signage and labels to ensure they are visible and legible
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - tyres/wheels for damage/wear and rail conditions are serviceable
  - visual damage or equipment faults
- completing operational checks ensuring:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions are operated
  - Lifting gear movements and control functions are smooth and comply with operating requirements
  - hazard warning systems, safety, audible and visual warning devices including travel alarms, lights and horns are functional
  - start-up is in accordance with manufacturer requirements and workplace procedures
  - there are no unusual noises
  - long and cross travel, transmission and brake functions comply with operating requirements
- confirming and following traffic management plan procedures relevant to their role in the work area
- controlling the load and attachments including:
  - rotation of load, or magnetic or vacuum lifting attachment or grab attachment or multiple non-synchronised hoists operated simultaneously but independently
  - long and cross travel
  - positioning crane in relevant area for next task
- determining any defects or faults with operation of crane and reporting to relevant personnel

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- ensuring risk control measures within the work area are effective as per workplace procedures
- ensuring stability of load and avoidance of hazards by applying best crane practice including:
  - lifting attachment and lifting gear as low as possible
  - carrying load near to ground surface
  - accelerating and braking to minimize load swing
  - lowering load onto appropriate dunnage safely taking into consideration swing and restrictions of area
  - minimum speed
  - using handheld taglines
- following directions of dogger or rigger when load is outside vision of operator or lift plan determines it
- inputting crane configuration into crane computer (where fitted) and checking operation to accurately reflect crane configuration
- interpreting and confirming relevant documentation for the work task and relevant area
- interpreting and acting on communications signals including:
  - hoist down - hand, whistle and radio
  - hoist up - hand, whistle and radio
  - traverse (trolley) travel - hand, whistle and radio
  - long (bridge) travel - hand, whistle and radio
  - creep - hand, whistle and radio
  - stop - hand, whistle and radio
- maintaining three points of contact whilst accessing crane and ensure rungs / steps are free of hazards if applicable
- monitoring load disconnection from hook/lifting gear is safe and ensuring no movement of controls
- operating a bridge or gantry crane configured to lift and move four different loads using the main hook through an obstacle course using all crane operational controls while the load is in full view of the crane operator. Loads must consist of:
  - a load at least 10% of the Maximum Rated Capacity (MRC) of the crane, and
  - A round load with a minimum diameter of 300 mm and minimum length of 3 m that requires a dogger to sling, and
  - an asymmetrical load that requires a dogger to sling, and
  - stillage containing at least ten scaffolding standards or containing a load of steel pipes of equivalent weight that requires a dogger to sling
- positioning the crane for safe operation for:
  - application of the task
  - manoeuvring in the workplace
  - stability of the crane and the load
- recording and maintaining accurate information relating to crane operations
- reporting to relevant person/s on site risk control measures that are not in place or deficient
- setting up and validating an exclusion zone

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- shutting down a bridge and gantry crane in accordance with manufacturer requirements and workplace procedures
- test-lifting load just clear of lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure:
  - slinging is correct
  - all crane equipment is functioning properly
  - load centre of gravity is correct
  - loads of unusual shape or weight distribution are correctly slung
- test-lifting load just clear of lifting plane to allow for checks of crane computer (where fitted) to ensure:
  - load measuring equipment can be used to verify calculated weight of load
  - near capacity loads do not overload crane
- using two-way radio communication during movement of load

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:

- appropriate workplace communication procedures including:
  - bells
  - buzzers
  - listening
  - hand signals
  - questioning techniques
  - signage
  - two-way radios
  - written instructions
  - whistles
- bridge and gantry crane characteristics and capabilities
- crane configuration mathematical calculations to:
  - estimate loads
  - relevant lifting accessories to perform work/task
- crane and lifting gear load chart/s and manufacturer requirements
- hazards including:
  - erection and pack up
  - crane stability
  - ground stability and condition including recently filled trenches and slopes
  - insufficient lighting
  - obstacles or obstruction
  - other specific hazards and dangerous materials

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    - overhead hazards including:
        - electric lines
        - service pipes
        - structures
    - traffic including pedestrians, vehicles and other plant
    - operations on unusual, uneven or difficult terrains
- lift impacting factors including:
    - centre of gravity
    - dynamic nature of load
    - flex/deflexion of load
    - length
    - weight
- manufacturer requirements and instructions on shutting down crane
- problems and application of appropriate response procedures to unplanned and/or unsafe situations and environmental conditions including:
    - wind, lightning and storms
    - failure of equipment
    - failure/loss of control including brakes
    - obstacles and obstructions
- prestart and operational checks required for a bridge and gantry crane
- relevant workplace instructions, safety information, emergency procedures
- relevant documentation requirements and procedures for recording, reporting and maintaining workplace records and information
- risk assessment management and mitigation strategies including hierarchy of control:
    - elimination
    - substitution
    - isolation
    - engineering controls
    - administrative controls
    - personal protective equipment (PPE)
- roles and responsibilities of duty holders as per legislative obligations of Work Health and Safety (WHS)/Occupational health and Safety (OHS)/Occupational Safety and Health (OSH) requirements and safe work / workplace procedures
- starting procedure of crane as per manufacturer requirements
- weather bureau forecasts and associated information and environmental conditions that could impact operation including:
    - lightning
    - rain
    - wind
    - water impacted ground
    - Ultra Violet (UV) exposure

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- workplace standards, requirements, policies and procedures for conducting operations for the bridge and gantry crane

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 equipment must include:

- access to a bridge and gantry crane in safe/serviceable working order and have the following characteristics:
  - appropriate bridge crane, a bridge beam mounted at each end to an end carriage, capable of travelling along elevated runways and having one or more hoisting mechanisms arranged to traverse across the bridge
  - appropriate gantry crane, a bridge beam, supported at each end by legs mounted on end carriages, capable of travelling on supported surfaces or deck levels, whether fixed or not, which has a crab with one or more hoisting units arranged to travel across the bridge
  - if remote controlled crane must have more than three powered operations that includes:
    - rotation of load, or
    - magnetic or vacuum lifting attachment, or
    - grab attachment, or
    - multiple hoists operated simultaneously but independently
- appropriate loads as outlined in the performance evidence requirements
- associated personnel to sling and direct loads including:
  - dogger or rigger
- communications equipment including:
  - bells
  - buzzers
  - two-way radios
  - whistles
- relevant personal protective equipment (PPE)
- safety devices including:

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  - audible and visual travel devices
  - horns/sirens
  - lights
- where appropriate, relevant workplace procedures and standards for operating a bridge and gantry crane including:
  - approved codes of practice and guidance
  - Australian Standards
  - checklists
  - safe work operating procedures
  - relevant industry standards (where applicable)
  - logbook
  - manufacturer guidelines (instructions, specifications or checklists)
  - relevant workplace documentation

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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TLILIC0010 Licence to operate a slewing mobile crane (up to 20 tonnes)

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 specifies the skills and knowledge required to safely operate a slewing mobile crane with a maximum rated capacity (MRC) up to 20 tonnes, in accordance with all relevant legislative responsibilities. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

A person undertaking this unit must hold:

- a current National High-Risk Work Licence (HRWL) to perform dogging or a certification for a specific VET course for HRWL to perform dogging

Slewing mobile crane means a mobile crane incorporating a boom or jib that can be slewed, but does not include:

- a front-end loader or
- a backhoe or
- an excavator or
- other earth moving equipment, when configured for crane operation.

A person performing this work is required to hold a slewing mobile crane with an MRC up to 20 tonnes high risk work (HRW) licence.

This unit requires a person operating a slewing mobile crane with an MRC up to 20 tonnes 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.

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Pre-requisite Unit

Not applicable

Competency Field

LIC - Licencing Units

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 a lift plan is confirmed with associated personnel and a site inspection is conducted in accordance with workplace procedures
	1.2 Work area operating surface is confirmed to determine ground suitability for operational use of mobile crane in accordance with workplace procedures
	1.3 Mobile crane rated capacity (RC) and the lifting gear Working Load Limit (WLL) are established for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the mobile crane and moving and placing load/s in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard identification and risk elimination/control measures are applied and advised to associated personnel in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed in accordance with workplace procedures

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	1.7	Appropriate communication procedures are identified with associated personnel in accordance with workplace procedures
	1.8	All crane and lifting operations are confirmed to ensure relevant work area requirements are correct in accordance with a lift plan and workplace procedures
2 Prepare for work/task	**2.1**	Consultation with workplace personnel is established and maintained to ensure lift plan is clear and consistent with site requirements in accordance with a lift plan and workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with the lift plan and safe work procedures
	2.3	Mobile crane is accessed safely in accordance with manufacturer requirements and safe work procedures
	2.4	Pre-start mobile crane 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
	2.5	Mobile crane is set up correctly with any lifting gear as and stabilised as per the lift plan in accordance with relevant manufacturer requirements including load chart/s and safe work procedures
	2.6	Fly jib is set up as required in accordance with specific manufacturer requirements and safe work procedures
	2.7	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
	2.8	Crane logbook is checked to confirm current compliance, is correct for the crane type, is completed and signed and required rectifications have been signed off in accordance with manufacturer requirements and safe work procedures

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	2.9	Weather and work environment conditions are assessed to determine any impact on mobile crane operations in accordance with manufacturer requirements and safe work procedures
3 Perform work/task	**3.1**	Lifts are determined within the RC of the mobile crane in accordance with the load chart/s and lift plan
	3.2	Boom/jib and hook block is safely positioned over the load following directions from associated personnel in accordance with the lift plan and safe work procedures
	3.3	Main hook including any lifting gear, where required are connected to the load and used safely in accordance with the lift plan, safe work procedures and manufacturer requirements
	3.4	Test lift is carried out in accordance with dogging and safe work procedures
	3.5	Loads are transferred using relevant crane movements and tag lines as required, in accordance with lift plan and safe work procedures
	3.6	Load and crane movement is monitored constantly and crane is operated safely in accordance with lift plan and safe work procedures
	3.7	All required communication signals are correctly interpreted and followed whilst crane is operated in accordance with the lift plan and safe work procedures
	3.8	Load is lowered and landed safely in accordance with lift plan and safe work procedures
	3.9	Lifting gear is positioned for safe disconnection from the load and crane is positioned for next task in accordance with lift plan and safe work procedures
4 Pack up	**4.1**	Crane boom/jib, lifting gear and associated equipment is stowed and secured as required in accordance with manufacturer requirements and safe work procedures

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4.2 Crane fly jib is removed to storage position and secured as required in accordance with manufacturer requirements and safe work procedures

4.3 Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures

4.4 Outriggers, plates and/or packing are stowed and secured in accordance with manufacturer requirements and safe work procedures

4.5 Crane is shut down and secured to prevent unauthorised access/use in accordance with safe work procedures

4.6 Shut down crane checks are carried out in accordance with safe work procedures and manufacturer 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC3008 Licence to operate a slewing mobile crane (up to 20 tonnes)

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 TLILIC0010 Licence to operate a slewing mobile crane (up to 20 tonnes)

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 relevant mathematical calculations in conjunction with lift plan and load chart to determine radius requirements and relevant lifting gear to perform work/task to enable crane to be configured for load including:
  - boom
  - counterweight/s
  - fly-jib
  - line pull
  - outrigger positioning
  - type of hook
- applying relevant crane movements including:
  - boom/jib up and down (luffing)
  - catching load swing appropriately
  - positioning and using main and auxiliary hook and lifting gear to connect to load safely
  - raise and lower hoist
  - slew boom/jib
  - telescope in and out (where manufacturer requirements allow)
  - travel
- carrying out operational checks ensuring:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions are operated
  - lifting gear movements and control functions are smooth and comply with lift plan
  - hazard warning systems, safety, audible and visual warning devices are checked for to ensure they are functional including:
    - reversing beepers
    - lights
    - horns
    - crane computer alarm (where fitted)

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        - anti-two block alarms (where fitted)
    - start-up is in accordance with manufacturer requirements and safe work procedures
    - there are no unusual noises
    - steering, transmission and brake functions comply with operating requirements
- conducting and applying risk and hazard assessment strategies including:
    - confirming work area operating surface suitability based on crane and task requirements
    - dynamic loads
    - load swing
    - overloading
    - pick and placement of load
    - tyre pressures or track condition
    - asymmetric loads
    - overhead hazards
    - restricted and poorly ventilated areas
    - risk of collision with people, moving plant and fixed structures
    - adequate lighting
    - weather conditions
- complying with Commonwealth, state and territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation and safe work procedures
- communicating with other associated personnel through using appropriate workplace procedures which including:
    - 2-way radio
    - active listening
    - demonstrating and interpreting hand signals
    - questioning to confirm understanding
    - signage/visual aids
    - whistles
    - written instructions
- completing the pre-start check including:
    - boom wiring harness connection
    - engine / mechanical fluid level checks as required by manufacturer requirements
    - ensure rungs / steps are free of hazards
    - fire extinguisher
    - fluid leaks
    - lights work effectively
    - locating, identifying and confirming all controls
    - mirrors and seat are adjusted appropriately for the operator
    - presence of correct logbook
    - safety equipment checks

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  - signage and labels to ensure they are visible and legible
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - tyres and wheels for damage/wear and correct inflation
  - updating records as required
  - visual damage or equipment faults
- confirming and following traffic management plan procedures relevant to their role in the work area
- determining any defects or faults with operation of crane, recording in relevant documentation and reporting to relevant person/s
- ensuring risk control measures within the work area are effective as per safe work procedures
- following directions of dogger or rigger
- inputting crane configuration into crane computer (where fitted) and checking operation to accurately reflect crane configuration
- interpreting and acting on communications signals including:
  - hoist down - hand and whistle and 2-way radio
  - hoist up - hand and whistle and 2-way radio
  - luff boom down - hand and whistle and 2-way radio
  - luff boom up - hand and whistle and 2-way radio
  - slew left - hand and whistle and 2-way radio
  - slew right - hand and whistle and 2-way radio
  - stop - hand and whistle and 2-way radio
  - telescope in - hand and whistle and 2-way radio (where manufacturer requirements allow)
- telescope out - hand and whistle and 2-way radio (where manufacturer requirements allow)
- interpreting and confirming relevant documentation for the work task and relevant area
- maintaining three points of contact whilst accessing crane
- monitoring load disconnection from hook is safe and ensuring no movement of crane operational controls
- operating a slewing mobile crane configured to a rated capacity (RC) of between 7tonne and up to 20tonne to lift and move four different loads using the main hook through an obstacle course including a 180-degree minimum slew using all crane operational controls while the load is in full view of the crane operator. Loads must consist of:
  - a load of >50% of the Rated Capacity (RC) of the crane with a boom length of >75%, and
  - stillage containing at least ten scaffolding standards or containing a load of steel pipes of equivalent weight that requires a dogger to sling, and
  - an asymmetric load that requires a dogger to sling, and
  - a round load with a minimum diameter of 300 mm and minimum length of 3 m that requires a dogger to sling
- positioning the mobile crane for safe operation for:
  - application of the task/s
  - manoeuvring in the workplace
  - the stability of the mobile crane and the load

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- recording and maintaining accurate information relating to crane operations
- reporting to relevant person/s on workplace control measures that are not in place or deficient
- setting up and validating an exclusion zone as per the lift plan
- shutting down a slewing mobile crane in accordance with manufacturer requirements and safe work procedures
- stabilising a slewing mobile crane for operation by:
  - correctly positioning plates or packing
  - deploying outriggers
  - establishing correct size plates or packing in accordance with the lift plan
  - levels are checked
- test-lifting load just clear of lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure:
  - slinging is correct
  - all crane equipment is functioning properly
  - load centre of gravity is correct
  - loads of unusual shape or weight distribution are correctly slung
- test-lifting load just clear of lifting plane to allow for checks of crane computer (where fitted) to ensure:
  - load measuring equipment can be used to verify calculated weight of load
  - near capacity loads do not overload crane

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:

- appropriate workplace communication procedures including:
  - listening
  - hand signals
  - questioning techniques
  - signage
  - two-way radios
  - written instructions
  - whistles
- crane configuration mathematical calculations to:
  - estimate loads
  - radius requirements
  - relevant lifting gear to perform work/task
- characteristics and impact of factors affecting non-slewing articulated mobile crane stability whilst mobiling loads compared to slewing crane including:
  - articulation of crane

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    - correct tyre pressure (inflation/condition)
    - driving safely on public and private roadways
    - unique handling characteristics of a mobile articulated crane and the emergency procedures in the event of loss of control as per manufacturer recommendations
    - pick up and carry the load
    - side slope derations
- characteristics and impact of factors affecting vehicle loading crane stability whilst mobiling loads compared to slewing crane including:
    - correct tyre pressure (inflation/condition)
    - emergency procedures in the event of incident
    - position of operator
    - use of stabilizers
- characteristics and impact of factors affecting reach stacker stability whilst mobiling loads compared to slewing crane including:
    - correct tyre pressure (inflation/condition)
    - driving safely on road ways
    - emergency procedures in the event of incident
    - impact of boom height and steering on stability
    - use of stabilizers
- crane, lifting gear load chart/s and manufacturer requirements
- lift impacting factors including:
    - centre of gravity
    - dynamic nature of load
    - flex/deflexion of boom
    - length of load
    - radius of boom during lift
    - weight
- set up of:
    - jib
    - fly jib
- hazards including:
    - erection and pack up
    - crane stability
    - ground stability and condition including recently filled trenches and slopes
    - insufficient lighting
    - obstacles or obstruction
    - other specific hazards and dangerous materials
    - overhead hazards including:
        - electric lines
        - service pipes

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    - structures
    - vegetation (trees)
  - traffic including pedestrians, vehicles and other plant
  - operations on unusual, uneven or difficult terrains
- manufacturer requirements on outrigger procedures
- manufacturer requirements and instructions on shutting down and packing up crane
- mobile slewing crane characteristics and capabilities to allow crane configuration to suit a range of loads
- relevant workplace instructions, safety information, emergency procedures
- relevant documentation requirements and procedures for recording, reporting and maintaining workplace records and information
- risk assessment management and mitigation strategies including hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)
- roles and responsibilities of duty holders as per legislative obligations of Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) requirements, safe work and workplace procedures
- prestart and operational checks required for a slewing mobile crane
- weather bureau forecasts and environmental conditions that could impact operation including:
  - lightning
  - wind
  - water impacted ground
  - Ultra Violet (UV) exposure
- problems and appropriate response procedures to unplanned and/or unsafe situations and environmental conditions
- stability of load and avoidance of hazards using best crane practice including:
  - allowing for boom deflection
  - boom/jib as low as possible
  - carrying load near to ground surface
  - crane stability
  - gently accelerating and braking on slew/boom to minimise load swing
  - lowering load safely onto appropriate dunnage taking into consideration swing and restrictions of area
  - minimum boom/jib length
  - minimum speed
  - using handheld taglines as required

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    - identification of incorrect sling of load
- starting procedure of crane as per manufacturer requirements
- workplace standards, requirements, policies and procedures for conducting safe work operations for the mobile slewing crane
- work area suitability based on relevant ground reports including:
    - backfilled ground
    - bitumen
    - concrete
    - hard compacted soil
    - pre-contaminated soils
    - rock
    - rough uneven ground
    - soft soils

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 that must include access to:

- slewing mobile crane with a Maximum Rated Capacity (MRC) of between 7 tonnes to 20 tonnes in safe/serviceable working order in accordance with manufacturer specifications
- appropriate loads as outlined in the performance evidence requirements
- appropriate personnel to sling and direct loads including:
    - dogger or rigger
- communications equipment including:
    - two-way radios
    - whistles
- relevant personal protective equipment (PPE)
- relevant documentation for operating a slewing mobile crane with a MRC up to 20 tonnes including:
    - approved codes of practice and guidance

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- Australian Standards
- checklists
- safe work operating procedures
- relevant industry standards (where applicable)
- logbook
- manufacturer guidelines (instructions, specifications or checklists)
- relevant workplace documentation

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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TLILIC0013 Licence to operate a slewing mobile crane (up to 60 tonnes)

Modification History

Release 1. This is a new release of this unit of competency in the TLI Transport and Logistics Training Package.

Application

This unit specifies the skills and knowledge required to safely operate a slewing mobile crane with a Maximum Rated Capacity (MRC) up to 60 tonnes, in accordance with all relevant legislative responsibilities. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

A person undertaking this unit must hold:

- a current National High-Risk Work Licence (HRWL) to perform dogging or a certification for a specific VET course for HRWL to perform dogging

Slewing mobile crane means a mobile crane incorporating a boom or jib that can be slewed, but does not include:

- a front-end loader or
- a backhoe or
- an excavator or
- other earth moving equipment, when configured for crane operation.

A person performing this work is required to hold a slewing mobile crane with an MRC up to 60 tonnes HRWL.

This unit requires a person operating a slewing mobile crane with an MRC up to 60 tonnes 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.

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Pre-requisite Unit

Not applicable

Competency Field

LIC - Licencing Units

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 a lift plan is confirmed with associated personnel and a site inspection is conducted in accordance a with workplace procedures
	1.2 Work area operating surface is confirmed to determine ground suitability for operational use of mobile crane in accordance with lift plan, safe work and workplace/s procedures
	1.3 Mobile crane rated capacity (RC) and the lifting gear Working Load Limit (WLL) are established and suitable for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the mobile crane and moving and placing load/s in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard identification and risk elimination/control measures are applied and advised to associated personnel in accordance with workplace procedures

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	1.6	Traffic management plan implementation is confirmed in accordance with workplace procedures
	1.7	Appropriate communication procedures are identified with associated personnel in accordance with workplace procedures
	1.8	All crane and lifting operations are confirmed to ensure relevant work area requirements are correct in accordance with a lift plan and workplace procedures
2 Prepare for work/task	**2.1**	Consultation with workplace personnel is established and maintained to ensure all crane and lifting operations are clear and consistent with site requirements in accordance with a lift plan and workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with the lift plan and safe work procedures
	2.3	Mobile crane is accessed safely in accordance with manufacturer requirements and safe work procedures
	2.4	Pre-start mobile crane 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
	2.5	Mobile crane is set up correctly with any lifting gear and stabilised as per the lift plan in accordance with relevant manufacturer requirements including load chart/s and safe work procedures
	2.6	Counterweight/s are set up as required in accordance with the lift plan, relevant manufacturer requirements and safe work procedures
	2.7	Fly jib and/or luffing fly are set up as required in accordance with specific manufacturer requirements 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

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	2.9	Crane logbook is checked to confirm current compliance, is correct for the crane type, is completed and signed and required rectifications have been signed off in accordance with manufacturer requirements and safe work procedures
	2.10	Weather and work environment conditions are assessed to determine any impact on mobile crane operations in accordance with manufacturer requirements and safe work procedures
3 Perform work/task	**3.1**	Lifts are determined to be within the RC of the mobile crane in accordance with the load chart/s and lift plan
	3.2	Boom/jib and hook block is safely positioned over the load following directions from associated personnel in accordance with the lift plan and safe work procedures
	3.3	Main and/or auxiliary hook including any lifting gear, where required are connected to the load and used safely in accordance with the lift plan, safe work procedures and manufacturer requirements
	3.4	Test lift is carried out in accordance with dogging and safe work procedures
	3.5	Loads are transferred using relevant crane movements and tag lines as required, in accordance with lift plan and safe work procedures
	3.6	Load and crane movement is monitored constantly and crane is operated safely in accordance with lift plan and safe work procedures
	3.7	All required communication signals are correctly interpreted and followed whilst crane is operated in accordance with the lift plan and safe work procedures
	3.8	Load is lowered and landed safely in accordance with lift plan and safe work procedures
	3.9	Lifting gear is positioned for safe disconnection from the load and crane is positioned for next task in accordance with lift plan and safe work procedures

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4 Pack up	**4.1**	Crane boom/jib, lifting gear and associated equipment is stowed and secured as required in accordance with manufacturer requirements and safe work procedures
	4.2	Crane fly jib and/or luffing fly and counterweight/s is removed to storage position and secured as required in accordance with manufacturer requirements and safe work procedures
	4.3	Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures
	4.4	Outriggers, plates and/or packing are stowed and secured in accordance with manufacturer requirements and safe work procedures
	4.5	Crane is shut down and secured to prevent unauthorised access/use in accordance with safe work procedures
	4.6	Shut down crane checks are carried out in accordance with safe work procedures and manufacturer 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC4009 Licence to operate a slewing mobile crane (up to 60 tonnes)

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Links

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Assessment Requirements for TLILIC0013 Licence to operate a slewing mobile crane (up to 60 tonnes)

Modification History

Release 1. This is a new 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 must include:

- applying relevant mathematical calculations in conjunction with lift plan and load chart to determine radius requirements and relevant lifting gear to perform work/task to enable crane to be configured for load including:
  - boom
  - counterweight/s
  - fly-jib
  - line pull
  - outrigger positioning
  - type of hook
- applying relevant crane movements in crane operations including:
  - boom/jib up and down (luffing)
  - catching load swing appropriately
  - positioning and using main and auxiliary hook and lifting gear to connect to load safely
  - raise and lower hoist
  - slew boom/jib
  - telescoping in and out (where manufacturer requirements allow)
- conducting and applying hazard and risk assessment strategies including:
  - adequate lighting
  - asymmetric loads
  - confirming work area operating surface suitability based on crane and task requirements
  - dynamic loads
  - lifting and placing load
  - load swing
  - overhead hazards
  - overloading
  - restricted and poorly ventilated areas
  - risk of collision with people, moving plant and fixed structures

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  - tyre pressures or track condition
  - weather conditions
- complying with Commonwealth, state and territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation and safe work procedures
- communicating with other associated personnel through using appropriate workplace procedures which including:
  - 2-way radio
  - demonstrating and interpreting hand signals
  - questioning to confirm understanding
  - signage/visual aids
  - whistles
  - written instructions
- conducting the pre-start checks including:
  - boom wiring harness connection (where fitted)
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - engine / mechanical fluid level checks as required by manufacturer requirements
  - ensure rungs / steps are free of hazards
  - fire extinguisher
  - fluid leaks
  - lights work effectively
  - locating, identifying and confirming all controls
  - mirrors and seat are adjusted appropriately for the operator
  - presence of correct logbook
  - safety equipment checks
  - signage and labels to ensure they are visible and legible
  - tyres and wheels for damage/wear and correct inflation
  - updating records as required
  - visual damage or equipment faults
- conducting operational checks ensuring:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions are operated
  - hazard warning systems, safety, audible and visual warning devices are checked for to ensure they are functional including:
    - reversing beepers
    - lights
    - horns
    - crane computer alarm (where fitted)
    - anti-two block alarms (where fitted)
  - confirming and following traffic management plan procedures relevant to their role in the

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work area
    - lifting gear movements and control functions are smooth and comply with lift plan
    - start-up is in accordance with manufacturer requirements and safe work procedures
    - steering, transmission and brake functions comply with operating requirements
    - there are no unusual noises
- determining any defects or faults with operation of crane, recording in relevant documentation and reporting to relevant person/s
- ensuring risk control measures within the work area are effective as per safe work procedures
- following directions of dogger or rigger
- inputting crane configuration into crane computer (where fitted) and checking operation to accurately reflect crane configuration
- interpreting and confirming relevant documentation for the work task and relevant area
- interpreting and acting on communications signals including:
    - hoist down - hand and whistle and 2-way radio
    - hoist up - hand and whistle and 2-way radio
    - luff boom down - hand and whistle and 2-way radio
    - luff boom up - hand and whistle and 2-way radio
    - slew left - hand and whistle and 2-way radio
    - slew right - hand and whistle and 2-way radio
    - stop - hand and whistle and 2-way radio
    - telescope in - hand and whistle and 2-way radio (where manufacturer requirements allow)
    - telescope out - hand and whistle and 2-way radio (where manufacturer requirements allow)
- monitoring load disconnection from hook is safe and ensuring no movement of crane operational controls
- maintaining three points of contact whilst accessing crane
- operating a slewing mobile crane configured with at least four parts of line greater than 20tonne and up to 60tonne to lift and move four different loads using the main hook through an obstacle course including a 180-degree minimum slew using all crane operational controls while the load is in full view of the crane operator. Loads must consist of:
    - a load of >50% of the Rated Capacity (RC) of the crane with a boom length of >75%, and
    - stillage containing at least ten scaffolding standards or containing a load of steel pipes of equivalent weight that requires a dogger to sling, and
    - an asymmetric load that requires a dogger to sling, and
    - a round load with a minimum diameter of 300 mm and minimum length of 3 m that requires a dogger to sling
- positioning the mobile crane as per the lift plan for safe operation for:
    - application of the task/s
    - manoeuvring in the workplace
    - the stability of the mobile crane and the load
- recording and maintaining accurate information relating to crane operations
- reporting to relevant person/s on workplace control measures that are not in place or deficient

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- setting up and validating an exclusion zone as per the lift plan
- shutting down a slewing mobile crane in accordance with manufacturer requirements and safe work procedures
- stabilising a slewing mobile crane for operation by:
  - correctly positioning plates or packing
  - deploying outriggers
  - establishing correct size plates or packing in accordance with the lift plan
  - levels are checked
- test-lifting load just clear of lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure:
  - slinging is correct
  - all crane equipment is functioning properly
  - load centre of gravity is correct
  - loads of unusual shape or weight distribution are correctly slung
- test-lifting load just clear of lifting plane to allow for checks of crane computer (where fitted) to ensure:
  - load measuring equipment can be used to verify calculated weight of load
  - near capacity loads do not overload crane

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:

- appropriate workplace communication procedures including:
  - hand signals
  - questioning techniques
  - signage
  - two-way radios
  - written instructions
  - whistles
- characteristics and impact of factors affecting non-slewing articulated mobile crane stability whilst mobiling compared to slewing crane including:
  - articulation of crane
  - correct tyre pressure (inflation/condition)
  - driving safely on public and private roadways
  - unique handling characteristics of a mobile articulated crane and the emergency procedures in the event of loss of control as per manufacturer recommendations
  - pick up and carry the load
  - side slope derations
- characteristics and impact of factors affecting vehicle loading crane stability whilst mobiling compared to slewing crane including:

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  - correct tyre pressure (inflation/condition)
  - emergency procedures in the event of incident
  - position of operator
  - use of stabilizers
- characteristics and impact of factors affecting reach stacker stability whilst mobiling compared to slewing crane including:
  - correct tyre pressure (inflation/condition)
  - driving safely on road ways
  - emergency procedures in the event of incident
  - impact of boom height and steering on stability
  - use of stabilizers
- crane configuration mathematical calculations to:
  - estimate loads
  - establish counterweight/s requirements
  - radius requirements
  - relevant lifting gear to perform work/task
- crane, lifting gear load chart/s and manufacturer requirements
- factors impacting lift including:
  - centre of gravity
  - dynamic nature of load
  - flex/deflection of boom
  - length of load
  - radius of boom during lift
  - weight
- hazards including:
  - erection and pack up
  - crane stability
  - ground stability and condition including recently filled trenches and slopes
  - insufficient lighting
  - obstacles or obstruction
  - other specific hazards and dangerous materials
  - overhead hazards including:
    - electric lines
    - service pipes
    - structures
    - vegetation (trees)
  - traffic including pedestrians, vehicles and other plant
  - operations on unusual, uneven or difficult terrains
- manufacturer requirements on outrigger procedures
- manufacturer requirements and instructions on shutting down and packing up crane

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- mobile slewing crane characteristics and capabilities to allow crane configuration to suit a range of loads
- prestart and operational checks required for a slewing mobile crane
- problems and appropriate response procedures to unplanned and/or unsafe situations and environmental conditions
- relevant workplace instructions, safety information, emergency procedures
- relevant documentation requirements and procedures for recording, reporting and maintaining workplace records and information
- risk assessment management and mitigation strategies including hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)
- roles and responsibilities of duty holders as per legislative obligations of Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) requirements, safe work and workplace procedures
- starting procedure of crane as per manufacturer requirements
- set up of:
  - jib
  - fly jib/luffing fly
  - counterweight/s
- stability of load and avoidance of hazards using best crane practice including:
  - allowing for boom deflection
  - boom/jib as low as possible
  - carrying load near to ground surface
  - crane stability
  - gently accelerating and braking on slew/boom to minimise load swing
  - lowering load safely onto appropriate dunnage taking into consideration swing and restrictions of area
  - minimum boom/jib length
  - minimum speed
  - using handheld taglines as required
  - identification of incorrect sling of load
- typical routine problems encountered operating a crane and equipment, and adjustments required for correction
- weather bureau forecasts and environmental conditions that could impact operation including:
  - lightning
  - wind

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  - water impacted ground
  - Ultra Violet (UV) exposure
- workplace standards, requirements, policies and procedures for conducting safe work operations for the mobile slewing crane
- work area suitability based on relevant ground reports including:
  - backfilled ground
  - bitumen
  - concrete
  - hard compacted soil
  - pre-contaminated soils
  - rock
  - rough uneven ground
  - soft soils

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.

As a minimum, resources for assessment must include access to:

- slewing mobile crane with a MRC greater than 20 tonnes and up to 60 tonnes in safe/serviceable working order in accordance with manufacturers specifications
- appropriate loads as outlined in the performance evidence requirements
- appropriate personnel to sling and direct loads including:
  - dogger or rigger
- communications equipment including:
  - two-way radios
  - whistles
- relevant personal protective equipment (PPE)
- relevant documentation for operating a slewing mobile crane with a MRC greater than 20 and up to 60 tonnes including:
  - approved codes of practice and guidance

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- Australian standards
- checklists
- safe work operating procedures
- relevant industry standards (where applicable)
- logbook
- manufacturer guidelines (instructions, specifications or checklists)
- relevant workplace documentation

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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TLILIC0015 Licence to operate a slewing mobile crane (over 100 Tonnes)

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 specifies the skills and knowledge required to safely operate a slewing mobile crane with a maximum rated capacity (MRC) over 100 tonnes, in accordance with all relevant legislative responsibilities. Competence in this unit, does not in itself result in a HRWL licence to operate this plant.

A person undertaking this unit must hold:

- a current National High-Risk Work Licence (HRWL) to perform dogging or a certification for a specific VET course for HRWL to perform dogging
- a current National HRWL to operate a Slewing Mobile crane (up to 100 Tonnes) or a certification for a specific VET course for HRWL to operate a Slewing Mobile crane (up to 100 Tonnes)

Slewing mobile crane means a mobile crane incorporating a boom or jib that can be slewed, but does not include:

- a front-end loader or
- a backhoe or
- an excavator or
- other earth moving equipment, when configured for crane operation.

A person performing this work is required to hold a slewing mobile crane with an MRC over 100 tonnes HRWL.

This unit requires a person operating a slewing mobile crane with an MRC over 100 tonnes 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.

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Pre-requisite Unit

Not applicable

Competency Field

LIC - Licencing Units

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 a lift plan is confirmed with associated personnel and a site inspection is conducted in accordance with workplace procedures
	1.2 Work area operating surface is confirmed to determine the quality of ground suitability for operational use of mobile crane in accordance with workplace procedures
	1.3 Mobile crane rated capacity (RC) and the lifting gear Working Load Limit (WLL) are established for the load/s and work/task requirements in accordance with manufacturer requirements and workplace procedures
	1.4 Appropriate paths for operating the mobile crane and moving and placing load/s in work area are assessed and determined in accordance with workplace procedures
	1.5 Relevant hazard identification and risk elimination/control measures are applied and advised to associated personnel in accordance with workplace procedures
	1.6 Traffic management plan implementation is confirmed and followed in accordance with workplace procedures

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	1.7	Appropriate communication procedures are identified and tested with associated personnel in accordance with workplace procedures
	1.8	All tasks are confirmed to ensure requirements for the relevant work area in accordance with a lift plan and workplace procedures
2 Prepare for work/task	**2.1**	Consultation with workplace personnel is established and maintained to ensure lift plan is clear and consistent with site requirements in accordance with a lift plan and workplace procedures
	2.2	Risk control measures for hazards identified are checked for implementation in accordance with the lift plan and safe work procedures
	2.3	Mobile crane is accessed safely in accordance with manufacturer requirements and safe work procedures
	2.4	Pre-start mobile crane 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
	2.5	Mobile crane is set up correctly with any lifting gear and stabilised as per the lift plan in accordance with relevant manufacturer requirements including load chart/s and safe work procedures
	2.6	Counterweight/s are set up as required in accordance with the lift plan, relevant manufacturer requirements and safe work procedures
	2.7	Fly jib and/or luffing fly are set up as required in accordance with specific manufacturer requirements 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

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	2.9	Crane logbook is checked to confirm current compliance, is correct for the crane type, is completed and signed and required rectifications have been signed off in accordance with manufacturer requirements and safe work procedures
	2.10	Weather and work environment conditions are assessed to determine any impact on mobile crane operations in accordance with manufacturer requirements and safe work procedures
3 Perform work/task	**3.1**	Lifts are determined within the RC of the mobile crane in accordance with the load chart/s and lift plan
	3.2	Boom/jib and hook block is safely positioned over the load following directions from associated personnel in accordance with the lift plan and safe work procedures
	3.3	Main and/or auxiliary hook including any lifting gear, where required are connected to the load and used safely in accordance with the lift plan, safe work procedures and manufacturer requirements
	3.4	Test lift is carried out in accordance with dogging and safe work procedures
	3.5	Loads are transferred using relevant crane movements and tag lines as required, in accordance with lift plan and safe work procedures
	3.6	Load and crane movement is monitored constantly and crane is operated safely in accordance with lift plan and safe work procedures
	3.7	All required communication signals are correctly interpreted and followed whilst crane is operated in accordance with the lift plan and safe work procedures
	3.8	Load is lowered and landed safely in accordance with lift plan and safe work procedures
	3.9	Lifting gear is disconnected from load and crane is positioned safely and efficiently for next task in accordance with lift plan and safe work procedures

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4 Pack up	**4.1**	Crane boom/jib, lifting gear and associated equipment is stowed and secured as required in accordance with manufacturer requirements and safe work procedures
	4.2	Crane fly jib and counterweight is removed to storage position and secured as required in accordance with manufacturer requirements and safe work procedures
	4.3	Relevant motion locks and brakes are applied as required in accordance with manufacturer requirements and safe work procedures
	4.4	Outriggers are stowed and secured in accordance with manufacturer requirements and safe work procedures
	4.5	Crane is shut down and secured to prevent unauthorised access/use in accordance with safe work procedures
	4.6	Plates or packing are stowed and secured in accordance with safe work procedures
	4.7	Shut down crane checks are carried out in accordance with safe work procedures and manufacturer 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC4011 Licence to operate a slewing mobile crane (over 100 tonnes)

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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 TLILIC0015 Licence to operate a slewing mobile crane (over 100 Tonnes)

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 relevant mathematical calculations in conjunction with lift plan and load chart to determine radius requirements and relevant lifting gear to perform work/task to enable crane to be configured for load including:
  - boom
  - counterweight/s
  - fly-jib
  - line pull
  - outrigger positioning
  - type of hook
- applying relevant crane movements including:
  - boom/jib up and down (luffing)
  - catching load swing appropriately
  - positioning and using main and auxiliary hook and lifting gear to connect to load safely
  - raise and lower hoist
  - slew boom/jib
  - telescope in and out
- conducting and applying hazard and risk assessment strategies including:
  - confirming work area operating surface suitability based on crane and task requirements
  - dynamic loads
  - load swing
  - overloading
  - lifting and placing load
  - tyre pressures or track condition
  - asymmetric loads
  - overhead hazards
  - restricted and poorly ventilated areas
  - risk of collision with people, moving plant and fixed structures

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  - adequate lighting
  - weather conditions
- complying with Commonwealth, state and territory Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) legislation and safe work procedures
- communicating with other associated personnel through using appropriate workplace procedures including:
  - 2-way radio
  - active listening
  - demonstrating and interpreting hand signals
  - questioning to confirm understanding
  - signage/visual aids
  - verbal language
  - whistles
  - written instructions
- completing the pre-start check including:
  - boom wiring harness connection
  - engine / mechanical fluid level checks as required by manufacturer requirements
  - ensure rungs / steps are free of hazards
  - fire extinguisher
  - fluid leaks
  - lights work effectively
  - locating, identifying and confirming all controls
  - mirrors and seat are adjusted appropriately for the operator
  - presence of correct logbook
  - safety equipment checks
  - signage and labels to ensure they are visible and legible
  - checking for signs of paint separation and stressed welds indicating potential structural weakness
  - tyres and wheels for damage/wear and correct inflation
  - updating records as required
  - visual damage or equipment faults
- inputting crane configuration into crane computer (where fitted) and checking operation to accurately reflect crane configuration
- carrying out operational checks ensuring:
  - all controls are located, identified and tested for functionality
  - all hydraulic functions are operated
  - lifting gear movements and control functions are smooth and comply with lift plan
  - hazard warning systems, safety, audible and visual warning devices are checked for to ensure they are functional including:
    - reversing beepers

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    - lights
    - horns
    - crane computer alarm (where fitted)
    - anti-two block alarms (where fitted)
  - start-up is in accordance with manufacturer requirements and safe work procedures
  - there are no unusual noises
  - steering, transmission and brake functions comply with operating requirements
- confirming and following traffic management plan procedures relevant to their role in the work area
- determining any defects or faults with operation of crane, recording in relevant documentation and reporting to relevant person/s
- ensuring risk control measures within the work area are effective as per safe work procedures
- following directions of dogger or rigger
- interpreting and acting on communications signals including:
  - hoist down - hand and whistle and radio
  - hoist up - hand and whistle and radio
  - luff boom down - hand and whistle and radio
  - luff boom up - hand and whistle and radio
  - slew left - hand and whistle and radio
  - slew right - hand and whistle and radio
  - stop - hand and whistle and radio
  - telescope in - hand and whistle and 2-way radio (where manufacturer requirements allow)
  - telescope out - hand and whistle and 2-way radio (where manufacturer requirements allow)
- interpreting and confirming relevant documentation for the work task and relevant area
- maintaining three points of contact whilst accessing crane
- monitoring load disconnection from hook is safe and ensuring no movement of crane operational controls
- operating a slewing mobile crane configured t with at least four parts of line greater than 100 tonnes and to lift and move four different loads using the main hook through an obstacle course including a 180-degree minimum slew using all crane operational controls while the load is in full view of the crane operator. Loads must consist of:
  - a load of >50% of the Rated Capacity (RC) of the crane with a boom length of >75%, and
  - stillage containing at least ten scaffolding standards or containing a load of steel pipes of equivalent weight that requires a dogger to sling, and
  - an asymmetrical load that requires a dogger to sling, and
  - A round load with a minimum diameter of 300 mm and minimum length of 3 m that requires a dogger to sling
- positioning the mobile crane for safe operation for:
  - application of the task/s
  - manoeuvring in the workplace

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    - the stability of the mobile crane and the load
- recording and maintaining accurate information relating to crane operations
- reporting to relevant person/s on workplace control measures that are not in place or deficient
- setting up and validating an exclusion zone
- shutting down a slewing mobile crane in accordance with manufacturer requirements and safe work procedures
- stabilising a slewing mobile crane for operation by:
    - correctly positioning plates or packing
    - deploying outriggers
    - establishing correct size plates or packing in accordance with the lift plan
    - levels are checked
- test-lifting load just clear of lifting plane to allow for checks to be safely made in consultation with associated personnel to ensure:
    - slinging is correct
    - all crane equipment is functioning properly
    - load centre of gravity is correct
    - loads of unusual shape or weight distribution are correctly slung
- test-lifting load just clear of lifting plane to allow for checks of crane computer (where fitted) to ensure:
    - load measuring equipment can be used to verify calculated weight of load
    - near capacity loads do not overload crane

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:

- appropriate workplace communication procedures including:
    - listening
    - hand signals
    - questioning techniques
    - signage
    - two-way radios
    - written instructions
    - whistles
- characteristics and impact of factors affecting non-slewing articulated mobile crane stability whilst mobiling loads compared to slewing crane including:
    - articulation of crane
    - correct tyre pressure (inflation/condition)
    - driving safely on public and private roadways
    - unique handling characteristics of a mobile articulated crane and the emergency procedures in the event of loss of control as per manufacturer recommendations

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  - pick and carry the load
  - side slope derations
- characteristics and impact of factors affecting vehicle loading crane stability whilst mobiling loads compared to slewing crane including:
  - correct tyre pressure (inflation/condition)
  - emergency procedures in the event of incident
  - position of operator
  - use of stabilizers
- characteristics and impact of factors affecting reach stacker stability whilst mobiling loads compared to slewing crane including:
  - correct tyre pressure (inflation/condition)
  - driving safely on road ways
  - emergency procedures in the event of incident
  - impact of boom height and steering on stability
  - use of stabilizers
- crane configuration mathematical calculations to:
  - estimate loads
  - establish counterweight/s requirements
  - radius requirements
  - relevant lifting gear to perform work/task
- crane, lifting gear load chart/s and manufacturer requirements
- lift impacting factors including:
  - centre of gravity
  - dynamic nature of load
  - flex/deflexion of boom
  - length of load
  - radius of boom during lift
  - weight
- hazards including:
  - erection and pack up
  - crane stability
  - ground stability and condition including recently filled trenches and slopes
  - insufficient lighting
  - obstacles or obstruction
  - other specific hazards and dangerous materials
  - overhead hazards including:
    - electric lines
    - service pipes
    - structures
    - vegetation (trees)

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  - traffic including pedestrians, vehicles and other plant
  - operations on unusual, uneven or difficult terrains
- manufacturer requirements on outrigger procedures
- manufacturer requirements and instructions on shutting down and packing up crane
- mobile slewing crane characteristics and capabilities to allow crane configuration to suit a range of loads
- relevant workplace instructions, safety information, emergency procedures
- relevant documentation requirements and procedures for recording, reporting and maintaining workplace records and information
- risk assessment management and mitigation strategies including hierarchy of control:
  - elimination
  - substitution
  - isolation
  - engineering controls
  - administrative controls
  - personal protective equipment (PPE)
- roles and responsibilities of duty holders as per legislative obligations of Work Health and Safety (WHS)/Occupational Health and Safety (OHS)/Occupational Safety and Health (OSH) requirements, safe work and workplace procedures
- prestart and operational checks required for a slewing mobile crane
- set up of:
  - jib
  - fly jib/luffing fly
  - counterweight/s
- starting procedure of crane as per manufacturer requirements
- weather bureau forecasts and associated information and environmental conditions that could impact operation including:
  - lightning
  - rain
  - wind
  - water impacted ground
  - Ultra Violet (UV) exposure
- problems and appropriate response procedures to unplanned and/or unsafe situations and environmental conditions including:
  - wind, lightning and storms
  - failure of equipment including hydraulic system
  - failure/loss of control including brakes and steering
  - obstacles and obstructions
  - unusual or difficult terrains
- stability of load and avoidance of hazards using best crane practice including:
  - allowing for boom deflection

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  - boom/jib as low as possible
  - carrying load near to ground surface
  - crane stability
  - gently accelerating and braking on slew/boom to minimise load swing
  - lowering load safely onto appropriate dunnage taking into consideration swing and restrictions of area
  - minimum boom/jib length
  - minimum speed
  - using handheld taglines as required
  - identification of incorrect sling of load
- workplace standards, requirements, policies and procedures for conducting safe work operations for the mobile slewing crane
- work area suitability based on relevant ground reports including:
  - backfilled ground
  - bitumen
  - concrete
  - hard compacted soil
  - pre-contaminated soils
  - rock
  - rough uneven ground
  - soft soils

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 that must include access to:

- slewing mobile crane with a MRC over 100 tonnes in safe/serviceable working order in accordance with manufacturer specifications
- appropriate loads as outlined in the performance evidence requirements
- appropriate personnel to sling and direct loads including:

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  - dogger or rigger
- communications equipment including:
  - two-way radios
  - whistles
- relevant personal protective equipment (PPE)
- relevant documentation for operating a slewing mobile crane with a MRC over 100 tonnes including:
  - approved codes of practice and guidance
  - Australian Standards
  - checklists
  - safe work operating procedures
  - relevant industry standards (where applicable)
  - logbook
  - manufacturer guidelines (instructions, specifications or checklists)
  - relevant workplace documentation

Links

Companion Volume Implementation Guide - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=df441c6e-213d-43e3-874c-0b3f7036d851

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TLILIC2015 Licence to drive a medium rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

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 obtain a licence to drive a medium rigid vehicle. It includes systematically and efficiently controlling all vehicle functions, monitoring traffic and road conditions, managing vehicle condition and performance, and effectively managing hazardous situations.

Types of medium rigid vehicles include:

- two axle rigid trucks, not being a prime mover, above 8 tonnes GVM or
- a two axle bus above 8 tonnes GVM.

Assessment of this unit will be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory driver licensing authority.

This unit applies to driving that is carried out in accordance with relevant state/territory driver licensing authority licence requirements and regulations for medium rigid vehicles.

Driving is performed with limited or minimum supervision, and with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain safety and to operate a medium rigid vehicle across a variety of driving contexts.

The primary legislative requirements applicable to this unit of competency are state/territory legislation in relation to road use and driver licensing.

This unit addresses the knowledge and skills necessary for the granting of a Medium Rigid Driver Licence.

Being awarded this unit of competency is a necessary requirement to obtain a Medium Rigid Driver Licence but is only one of several criteria. Prospective licence applicants should check with the state/territory driver licensing authority for other criteria (such as licence tenure and medical fitness) to confirm other eligibility requirements before undertaking training and/or assessment.

Pre-requisite Unit

Not applicable.

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Competency Field

LIC – Licensing

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 Drive a medium rigid vehicle	1.1 Medium rigid vehicle is started, steered, manoeuvred, positioned and stopped in accordance with traffic regulations, manufacturer instructions and relevant vehicle handling procedures
	1.2 Engine power is managed to ensure efficiency and performance, and to minimise engine and transmission damage
	1.3 Braking system of medium rigid vehicle is managed and operated efficiently to ensure effective control of vehicle under all conditions
	1.4 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving
	1.5 Medium rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning
	1.6 Medium rigid vehicle is parked, shutdown and safely secured according to traffic regulations
	1.7 Load is safely and effectively restrained
2 Monitor traffic and road conditions	2.1 Traffic and road conditions are constantly monitored and acted on to enable safe operation and to ensure no injury to people or damage to property, equipment, loads and facilities
	2.2 Interaction with other road users is conducted courteously in accordance with road rules to ensure safe and efficient traffic flow
3 Monitor and	3.1 Vehicle performance is maintained through pre-operational

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maintain vehicle performance		inspections and vehicle checks
	3.2	Appropriate signage, lights and equipment are checked for operational effectiveness and for conformity to prescribed traffic 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 can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit is equivalent to TLILIC2015B Licence to drive a medium rigid vehicle.

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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Assessment Requirements for TLILIC2015 Licence to drive a medium rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

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 one occasion and include:

- anticipating and monitoring traffic hazards and taking appropriate action
- applying precautions and required action to eliminate, minimise or control identified hazards
- applying relevant procedures that reflect legislative requirements
- carrying out pre-operational vehicle checks including:
  - checking and topping up fluid levels
  - checking:
    - brakes
    - operation of vehicle lights and indicators
    - tyre pressures
  - visually checking vehicle
- communicating effectively with others
- handling vehicle including:
  - accelerating and braking
  - managing engine performance
  - operating vehicle controls, instruments and indicators
  - positioning and stopping a vehicle
  - reversing a vehicle
  - starting a vehicle
  - steering and manoeuvring a vehicle
  - using defensive driving techniques
- negotiating a range of complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings)
- reading and interpreting relevant instructions, procedures, information and signs.

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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:

- driving hazards and related defensive driving techniques
- efficient driving techniques
- engine power management and safe driving strategies
- medium rigid vehicle controls, instruments and indicators, and their use
- medium rigid vehicle handling procedures
- pre-operational checks carried out on vehicle and related action
- relevant state/territory driver licensing authority road rules, regulations, permit and licence requirements.

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.

Practical driving aspects must be assessed in a vehicle typical of the class as approved by the state/territory driver licensing authority. The use of simulators for driver testing is not permitted.

The assessor must use the mandatory assessment tool provided by the state/territory driver licensing authority to conduct the assessment for this unit, in accordance with licensing authority requirements.

The state/territory driver licensing authority may prescribe approved routes, which must be used for the final assessment.

Assessment must occur in the following traffic and road conditions:

- on open and/or private roads with moderate inclines and declines
- typical weather conditions.

and may also include traffic and road conditions at a depot, base or warehouse.

Resources for assessment include:

- a range of relevant exercises, case studies and/or simulations
- appropriate range of relevant on-road operational or workplace situations
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- relevant materials, tools, equipment and personal protective equipment currently used in industry.

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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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TLILIC2016 Licence to drive a heavy rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

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 obtain a licence to drive a heavy rigid vehicle. It includes systematically and efficiently controlling all vehicle functions, monitoring traffic and road conditions, managing vehicle condition and performance, and effectively managing hazardous situations.

Heavy rigid vehicle includes:

- a rigid vehicle, not being an unladen prime mover, with a minimum of three axles and a minimum 15 tonnes GVM or
- a modified three axle prime mover with a certified detachable tray (with capacity to carry 75% of its specified GVM) with a GVM of 15 tonnes and holds dual registration (HC & HR) or
- a three axle articulated bus or
- a three axle bus above 15 tonnes GVM.

Assessment of this unit will be undertaken within a licensing examination conducted by, or under the authority of, the relevant state/territory driver licensing authority.

This unit applies to driving that is carried out in accordance with relevant state/territory driver licensing authority licence requirements and regulations for heavy rigid vehicles.

Driving is performed with limited or minimum supervision, and with limited accountability and responsibility for self and others in achieving the prescribed outcomes.

Driving involves the application of routine vehicle driving principles and procedures to maintain safety and to operate a heavy rigid vehicle across a variety of driving contexts.

The primary legislative requirements applicable to this unit of competency are state/territory legislation in relation to road use and driver licensing.

This unit addresses the knowledge and skills necessary for the granting of a Heavy Rigid Driver Licence.

Being awarded this unit of competency is a necessary requirement to obtain a Heavy Rigid Driver Licence but is only one of several criteria. Prospective licence applicants should check with the state/territory driver licensing authority for other criteria (such as licence tenure and medical fitness) to confirm other eligibility requirements before undertaking training and/or

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assessment.

Pre-requisite Unit

Not applicable.

Competency Field

LIC – Licensing

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 Drive a heavy rigid vehicle	1.1 Heavy rigid vehicle is started, steered, manoeuvred, positioned and stopped in accordance with traffic regulations, manufacturer instructions and relevant vehicle handling procedures
	1.2 Engine power is managed to ensure efficiency and performance, and to minimise engine and gear damage
	1.3 Braking system of heavy rigid vehicle is managed and operated efficiently to ensure effective control of vehicle under all conditions
	1.4 Driving hazards are identified and/or anticipated and avoided or controlled through defensive driving
	1.5 Heavy rigid vehicle is driven in reverse, maintaining visibility and achieving accurate positioning
	1.6 Heavy rigid vehicle is parked, shutdown and safely secured according to traffic regulations
	1.7 Load is safely and effectively restrained
2 Monitor traffic and	2.1 Traffic and road conditions are constantly monitored and acted on to enable safe operation and to ensure no injury to

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	road conditions		people or damage to property, equipment, loads and facilities
		2.2	Interaction with other road users is conducted courteously in accordance with road rules to ensure safe and efficient traffic flow
3	**Monitor and maintain vehicle performance**	3.1	Vehicle performance is maintained through pre-operational inspections and vehicle checks
		3.2	Appropriate signage, lights and equipment are checked for operational effectiveness and for conformity to prescribed traffic 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 can be found in the Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to TLILIC2016B Licence to drive a heavy rigid vehicle.

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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Assessment Requirements for TLILIC2016 Licence to drive a heavy rigid vehicle

Modification History

Release 2. This is the second release of this unit of competency in the TLI Transport and Logistics Training Package.

Modification of assessment conditions to remove an implementation barrier.

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 one occasion and include:

- anticipating and monitoring traffic hazards and taking appropriate action
- applying precautions and required action to eliminate, minimise or control identified hazards
- applying relevant procedures that reflect legislative requirements
- carrying out pre-operational vehicle checks including:
  - checking and topping up fluid levels
  - checking:
    - brakes
    - operation of vehicle lights and indicators
    - tyre pressures
  - visually checking vehicle
- communicating effectively with others
- handling vehicle including:
  - accelerating and braking
  - managing engine performance
  - operating vehicle controls, instruments and indicators
  - positioning and stopping a vehicle
  - reversing a vehicle
  - starting a vehicle
  - steering and manoeuvring a vehicle
  - using defensive driving techniques
- negotiating a range of complex traffic infrastructure (such as roundabouts, traffic lights, stalemate intersections, railway level crossings)
- reading and interpreting relevant instructions, procedures, information and signs.

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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:

- driving hazards and related defensive driving techniques
- efficient driving techniques
- engine power management and safe driving strategies
- heavy rigid vehicle controls, instruments and indicators, and their use
- heavy rigid vehicle handling procedures
- pre-operational checks carried out on vehicle and related action
- relevant state/territory driver licensing authority road rules, regulations, permit and licence requirements.

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.

Practical driving aspects must be assessed in a vehicle typical of the class as approved by the state/territory driver licensing authority. The use of simulators for driver testing is not permitted.

The assessor must use the mandatory assessment tool provided by the state/territory driver licensing authority to conduct the assessment for this unit according to licensing authority requirements.

The state/territory driver licensing authority may prescribe approved routes, which must be used for the final assessment.

Assessment must occur in the following traffic and road conditions:

- on open and/or private roads with moderate inclines and declines
- typical weather conditions.

and may also include traffic and road conditions at a depot, base or warehouse.

Resources for assessment include:

- a range of relevant exercises, case studies and/or simulations
- appropriate range of relevant on-road operational or workplace situations
- applicable documentation including workplace procedures, regulations, codes of practice and operation manuals
- relevant materials, tools, equipment and personal protective equipment currently used in industry.

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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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UEENEEC001B Maintain documentation

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the maintenance of the variety of documentation required to record work activities, purchases and expenses and compliance obligations. It encompasses documentation typically required in an electrotechnology enterprise, work instructions and procedures and time management.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit.

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT **PERFORMANCE CRITERIA**

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ELEMENT	PERFORMANCE CRITERIA
1 Prepare to maintain documentation	1.1 Documentation requirements and methods for the organisation/enterprise are identified, obtained and understood
	1.2 Advice is sought from the work supervisor, when necessary, to ensure the work is correctly documented and coordinate d effectively with others
	1.3 Forms required to document work are obtained in accordance with established routines and procedures
	1.4 OHS risk assessment and control measures are documented before work is commenced in accordance with established routine/procedures.
2 Maintain documentation.	2.1 Activities are documented promptly and at the appropriate time in accordance with established routine/procedures
	2.2 Documentation is checked for accuracy and clarity and any anomalies corrected
	2.3 Where applicable, signature is obtained from an appropriate person and the person's identification documented
	2.4 Where applicable, a copy of any required documentation is forwarded to an appropriate person in accordance with established routine/procedures
	2.5 Procedures for referring non-routine events to immediate supervisor for directions are followed

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and

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REQUIRED SKILLS AND KNOWLEDGE

maintaining documentation.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC001B Maintaining documentation

Evidence shall show an understanding of maintaining documentation to an extent indicated by the following aspects:

T1. Enterprise communication methods encompassing:

- Communicating with personnel encompassing:
  - Oral communications
  - Written procedures and work instructions
- Communicating with suppliers
- Communicating with customers

T2. 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

T3. Using basic computers and applications encompassing:

- Starting up
- Selecting application
- Entering information
- Saving
- Printing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1)** Longitudinal competency development approaches to

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assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this

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shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Maintain documentation in any electrotechnology enterprise information system, including:

    A Following enterprise documentation requirements.

    B Enabling documentation to communicate clearly to others.

    C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

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Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to maintaining documentation.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by maintaining documentation in any electrotechnology enterprise information system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

Competency Field **11)**

Commercial

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UEENEEC005B Estimate electrotechnology projects

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers estimate material and labour costs for competitive quotation/tenders for work exceeding $20k. It encompasses reading and understanding job specifications, material take-offs, determining labour and site requirements, costing and documenting.

Application of the Unit

Application of the Unit **2)**

This unit is suitable for competency development employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit.

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Ascertain the extent	1.1 OHS procedures for a given work area are

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ELEMENT	PERFORMANCE CRITERIA	
of the project.		identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures are followed.
	1.3	The extent of the project is established from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
	1.4	A date by which the estimate is to be completed is determined from design brief, specification and/or other relevant documentation and from discussions with appropriate person(s).
	1.5	Activities are planned to meet scheduled timeframe in consultation with others involved in the work.
2 Estimate project.	2.1	Material take-offs are performed accurately and checked against job specifications.
	2.2	Materials, labour and other costs are determined from industry standard labour rates, enterprise costing arrangements and /or material suppliers.
	2.3	Sources and availability of materials and human resources needed for the project are established in accordance with organisation policies and procedures.
	2.4	Estimates are checked and revised where necessary, for accuracy in costing and against job specification, in consultation with appropriate person(s).
	2.5	Solutions to unplanned events are implemented consistent with enterprise policy.
3 Document and submit quotation.	3.1	Project estimates are documented in accordance with established policies and procedures.
	3.2	Quotation is forwarded to appropriate person(s) for inclusion in a submission within the specified timeframe.
	3.3	Quotation documentation is filed in accordance

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ELEMENT	PERFORMANCE CRITERIA
	with established policies and procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and estimating electrotechnology projects.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC005B Electrotechnology projects estimation

Evidence shall show an understanding of estimating electrotechnology projects to an extent indicated by the following aspects:

T1. Estimating electrotechnology projects encompassing:

- Documents used in estimating
- Resources to be quantified and costed
- Material take-off methods
- Costing:
  - resource (labour, plant, equipment and materials)
  - contingency
  - money
  - margins
- Labour rates method of costing
- Life cycle costing analysis
- Documenting estimations and costing.
- Evaluating estimates and costs

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the

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EVIDENCE GUIDE

Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered

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holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Estimate electrotechnology projects as described in 8) including:
    - A Ascertaining the extent of the project accurately.
    - B Planning estimation work effectively.
    - C Estimating the job competitively.
    - D Checking the estimates accurately.
    - E Documenting the estimates clearly.
    - F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to estimating electrotechnology projects.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEED001B	Use basic computer applications relevant to a workplace

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Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to estimating at least two electrotechnology projects for a competitive quotation/tender. The value of the jobs shall exceeding $20k and may 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, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field **11)**

Commercial

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UEENEEC006B Prepare tender submissions for electrotechnology projects

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the preparation of tender documents. It encompasses reading and understanding tender requirements and project specifications, verifying estimates and capacity to meet timelines, complying with legal requirements and documenting submissions.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It applies to any formal recognition for this standard at the aligned AQF 5 level or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

4.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEC005B Estimate electrotechnology projects

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Ascertain tender requirements.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures are followed.
	1.3 The extent of the work under the tender is determined from tender documents.
	1.4 Special conditions and requirements for lodging the tender are ascertained from tender documents.
	1.5 Appropriately competent person(s) is engaged to estimate material, labour and other costs.
	1.6 Activities are planned to meet specified tender closing date/time.
2 Assemble tender submission.	2.1 All inputs to the tender are obtained and checked with 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 person(s) responsible.
	2.3 Legal advice is sought on contingent aspects of the tender.
	2.4 Contingency allowances are included in the tender in accordance with established policies and procedures.
3 Document tender submission.	3.1 Tender submission is documented in tender lodgement requirements and in accordance with established policies and procedures.
	3.2 Tender submission is checked for accuracy against tender documents and all other inputs and made ready for lodgement before the closing date/time.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and preparing tender submissions.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC006B Electrotechnology project tenders

Evidence shall show an understanding of electrotechnology project tenders to an extent indicated by the following aspects:

T1	Purpose and sources of a tender
T2	Documents supplied with a tender
T3	Typical special conditions included in a tender
T4	Tender submission requirements

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum,

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the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement

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- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Prepare tender submissions for electrotechnology projects as described in 8) including:

    A Ascertaining the extent of the work under the tender accurately

    B Ascertaining special conditions and requirements for lodging the tender

    C Planning tender submission work effectively

    D Checking all input to the tender submission accurately

    E Applying legal advise to contingent issues

    F Documenting the tender submission ready for lodgement before the closing date/time

    G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment

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environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to preparing tender submission for electrotechnology projects.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed:

UEENEED001B	Use basic computer applications relevant to a workplace

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to preparing tender submissions for at least two electrotechnology projects. The tenders apply to any of the following

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RANGE STATEMENT

electrotechnology disciplines.

- Automation technologies
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire Protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable/sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field **11)**

Commercial

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UEENEEC008B Receive and store materials and equipment for electrotechnology work

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the receiving and storing of materials and equipment for a construction site or workshop store. It encompasses receiving materials and equipment, checking consignment notes, storing materials and equipment and completing the necessary documentation.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of

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plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, and power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit.

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Receive materials and equipment.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work measures and procedures are followed.
		1.3	Documentation on pending material and equipment deliveries is read, and content and time of the delivery is understood.
		1.4	Deliveries are checked against consignment documentation before they are received.
		1.5	Discrepancies in deliveries are notified to work supervisor and supplier in accordance with established routines.
		1.6	Materials and equipment are handled in strict accordance with OHS risk control work preparation measures and procedures.
2	Store materials and equipment.	2.1	OHS risk control work measures and procedures are followed.
		2.2	Material and equipment are stored to prevent damage or loss in accordance with established routines.
		2.3	Security of the stored materials and equipment is maintained in accordance with established routines.
		2.4	Material and equipment documentation is forwarded to an appropriate person in accordance with established routine/procedures.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and of receiving and storing materials and equipment.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC008B Electrotechnology work store materials and equipment

Evidence shall show an understanding of electrotechnology work store materials and equipment to an extent indicated by the following aspects:

T1. Enterprise communication methods encompassing:

- Communicating with personnel encompassing:
  - Oral communications
  - Written procedures and work instructions
- Communicating with suppliers
- Communicating with customers

T2. 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

T3. Stock control methods encompassing:

- Enterprise purchasing policy
- Stock data base
- Purchase and sales entry mechanisms
- Reordering methods

T4. Using basic computers and applications encompassing:

- Starting up
- Selecting application
- Entering information
- Saving
- Printing

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Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in

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EVIDENCE GUIDE

the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Receive and store materials and equipment for electrotechnology work as described in 8) including:

    A Determining content and time of pending deliveries from relevant documentation.

    B Dealing with discrepancies in deliveries.

    C Storing and securing materials and equipment to prevent damage or loss.

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D Forwarding documentation appropriately.

E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to receiving and storing materials and equipment for electrotechnology work.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units

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that require formal documentation.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to receiving and storing materials and equipment for a construction site or workshop store.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

Competency Field **11)**

Commercial

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UEENEEC010B Deliver a service to customers

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the interacting with customers to identify and meet their service needs. It encompasses following community and enterprise policies and standards, identifying customer needs, identifying and resolving problems/issues and maintaining product/service quality.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practise in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit.

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Performance criteria describe the required performance needed to demonstrate achievement of the Element. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT **PERFORMANCE CRITERIA**

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ELEMENT	PERFORMANCE CRITERIA
1 Interact with customers.	1.1 Communication with customers is conducted in a professional and courteous manner according to established procedures.
	1.2 Customer enquiries are responded to promptly and politely and in accordance with established procedures.
	1.3 Personal dress and presentation is maintained in line with established procedures.
	1.4 Appropriate interpersonal skills are used to facilitate accurate and relevant exchange of information.
2 Identify customer needs.	2.1 Customer needs are assessed so that priorities for service delivery can be identified in accordance with established procedures.
	2.2 Appropriate questioning and active listening are used to determine customer needs.
	2.3 Customers are provided with information about available options for meeting their needs and assisted to identify their preferred option.
	2.4 Personal limitations in addressing customer needs are identified and where appropriate assistance is sought from appropriate personnel.
3 Deliver a service to customers.	3.1 Prompt customer service is provided to meet identified needs in accordance with established procedures.
	3.2 Service provided follows OHS policies and procedures and work is appropriately sequenced in accordance with requirements.
	3.3 Service provided is coordinated effectively with others involved on the work site.
	3.4 Customer complaints are handled sensitively and courteously in accordance with established procedures.
	3.5 Opportunities to enhance the quality of service and products are identified and taken whenever

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ELEMENT	PERFORMANCE CRITERIA	
		possible.
4 Evaluate and complete service.	4.1	Own work is monitored and adjusted according to requirements for job quality, customer service and efficient resource use.
	4.2	Customer service records are inspected and verified after service is completed to ensure requirements are met.
	4.3	Appropriate personnel are notified of the completion of the repair work and details are documented in accordance with established procedures and requirements.
	4.4	Variations in the quality of service and/or products from required standards are detected and reported in accordance with established procedures.
	4.5	Additional information or follow-up action is completed in line with customer needs.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and delivering a service to customers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EC010B Customer service

Evidence shall show an understanding of customer service to an extent indicated by the following aspects:

T1. Enterprise communication methods encompassing:

- Communicating with personnel encompassing:
  - Oral communications
  - Written procedures and work instructions

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REQUIRED SKILLS AND KNOWLEDGE

- Communicating with suppliers
- Communicating with customers

T2. 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

T3. Problem solving concepts and techniques encompassing:

- Identify problems - process and quality problems; equipment selection, availability and failure; teamwork and work allocation problems; safety and emergency situations and incident; performance gaps; profit improvement and the like.
- Mathematical Tools - average, standard deviation and the like.
- Use of analytical techniques in problem solving - brainstorming; fishbone diagrams/cause and effect diagrams; logic trees; process logic/process requirements; similarity/difference analysis; pare to analysis; force field/SWOT analysis.
- Using tools to assistance in problem solving - Procedures and work instructions; Safety data sheets; Job cards; Maintenance logs; Plant drawing.
- Determine corrective action:
  - Tools
  - Mode of communication procedure used within each enterprise
  - Established work procedures and policies
  - Size and structure of the teams/enterprise
  - Group goals - team, section, enterprise
  - Enterprise specific conflict resolution procedures
  - Action plans
  - Priority requirements
  - Measurable objectives
  - Resource requirements
  - Methods for reaching objectives
  - Timelines
  - Safety requirements
  - Risk assessment
  - Environmental requirements
- Communicate recommendations - feedback requirements; corrective action and analysis; following up recommendations and the like.
- Implement Monitoring encompassing:
  - Identifying components to be measured
  - Measurement and monitoring techniques

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REQUIRED SKILLS AND KNOWLEDGE

- Measurement and monitoring tools

T4. Enterprise customer relations protocols encompassing:

- Purpose of customer relations
- Procedures for dealing with customers
- Dealing with customer issues

T5. Enterprise quality management system encompassing:

- Purpose of a quality system
- Procedures pertaining to the relevant work function
- Work instructions pertaining to the relevant work function

T6. Instructing users in the use of specific items of equipment and systems encompassing:

- Methods for evaluating user needs - how equipment is used efficiently and safely and identifying wear and tear and damage to the equipment that requires repairing.
- Basic instruction methods - be appropriate to the culture of the users and the equipment for which instruction is given.
- Methods for evaluating user's ability use equipment correctly

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1)** Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances,

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assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit.

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It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Deliver a service to customers as described in 8) including:

    A Interacting with customers appropriately.

    B Identifying customer needs accurately.

    C Identifying and resolving customer issues promptly and amicably.

    D Delivering a service.

    E Reflecting on the completed service positively.

    F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry

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	simulation policy. The resources used for assessment should reflect current industry practices in relation to delivering a service to customers.
Method of assessment	**9.4)** This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5)** For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with any unit or units that require formal documentation.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated by delivering a service to customers in any of the electrotechnology disciplines.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

Competency Field **11)**

Commercial

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UEENEED101A Use computer applications relevant to a workplace

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the basic use of personal computers application relevant to a work function. It encompasses switching the computer on, applying user preferences, selecting basic applications, entering and retrieving information and printing files.

Note:

This unit applies to all aspects of Electrotechnology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly

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License to practice **3)**

related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace.

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to use computer applications.	1.1	OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
		1.2	Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.
		1.3	Information required for the use of the application is obtained from appropriate sources.
		1.4	Computer is started up and desktop icons are manipulated to access desired application, directories and files.
		1.5	On-screen instructions in relation to any anomaly such as a virus warning are followed.
		1.6	Help directory is used to resolve any straightforward start up or access issues or anomalies.
2	Use computer basic application.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Information is added, altered or deleted as needed in accordance with application user instructions.
		2.3	Routine checks are made to ensure accuracy of information in accordance with quality requirements.
3	Output information	3.1	Completed files are stored appropriately in

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ELEMENT	PERFORMANCE CRITERIA	
from an application.		accordance with enterprise requirements.
	3.2	Files are printed for a formal record and/or to forward to others.
	3.3	Files are sent via email in a readable format.
4 Shut down computer.	4.1	Files are named, arranged, saved and backed up in accordance with enterprise requirements.
	4.2	Computer shutdown procedures are followed and computer switched off.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices using basic computer applications relevant to a workplace.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED101A Basic Computer Applications

Evidence shall show an understanding of computer use basics to an extent indicated by the following aspects:

T1 Starting up

T2 Selecting application

T3 Entering information

T4 Saving

T5 Printing

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in

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EVIDENCE GUIDE

conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Use basic computer applications relevant to workplace as described in 8) and including:

A	Correctly starting-up a computer.
B	Dealing with anomalies appropriately.
C	Following application instructions to input and output information.
D	Storing information appropriately.

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E	Outputting information to a printer.
F	Forwarding information via email and/or web mail in a readable format.
G	Producing, storing and forwarding engineering related reports and/or results using at least three computer applications according to requirements
H	Shutting down a computer correctly
I	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

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.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

In addition to the resources listed above, evidence should show demonstrated competency to produce, store and forward engineering related reports and/or results using a range of

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computer applications.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall/may be demonstrated in relation to at least three of the following using computer applications to produce, store and forward engineering related reports and/or results at a basic level.

- Word processing
- Spread sheet
- Drawings
- Business management
- Apparatus set-up
- Note:

Apparatus set-up applications are invariably vendor specific and include

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RANGE STATEMENT

icon-based integration and control applications.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Computer Systems

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UEENEED104A Use engineering applications software on personal computers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the use of computer application relevant to engineering support work functions. It encompasses applying user preferences, using application menus and tools, entering and retrieve information, working with groups and transferring and printing files.

Note:

Examples of engineering application software are Visio, Electronic Work Bench, Lab View, Network Simulator.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment-based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a

Performance Criteria describe the required performance needed to demonstrate achievement of the element.

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competency standard unit	Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to use computer applications.	1.1	OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
		1.2	Established OHS risk control measures and procedures in relation to computer and keyboard use are followed.
		1.3	Application software and information required for use is obtained from appropriate sources.
		1.4	On-screen instructions in relation to any anomaly such as a virus warning are followed.
		1.5	Help menu is used to resolve any straightforward start up or access issues or anomalies.
2	Use engineering application software.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Techniques that apply to a particular software package are used to produce appropriate files.
		2.3	Routine checks are made to ensure accuracy of information in accordance with quality requirements.
3	Output information from an application.	3.1	Completed files are stored appropriately in accordance with enterprise requirements.
		3.2	Files are printed for formal records and/or forwarded to others.
4	Shut down computer.	4.1	Files are named, arranged, saved and backed up in accordance with enterprise requirements.
		4.2	Computer shutdown procedures are followed and computer switched off.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices using engineering application software.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED104A Personal computers, engineering applications software basic

Evidence shall show an understanding of object orientated programming basics to an extent indicated by the following aspects:

T1 Computer Systems Overview encompassing:

- Safety
- Applications of computers in industry
- Types of computer systems
- Hardware components
- Software and firmware
- Memory
- Peripherals
- Removable storage devices
- PC hardware inventory
- Networking

T2 Operating System Overview encompassing:

- Software layer model
- Function and characteristics of an operating system
- File structure
- Formatting disks
- Boot process
- Configuration files

T3 Windows Operating System encompassing

- Windows screen
- Windows Explorer
- File management
- Managing software, updates, backups and virus protection.

T4 Word Processors encompassing

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REQUIRED SKILLS AND KNOWLEDGE

- Word files
- Formatting
- Engineering symbols
- Tables and lists
- Drawings
- Spelling, grammar, and ‘search-and-replace’
- Printing

T5 Spreadsheets encompassing

- Parts of a spreadsheet
- Excel file management
- Inserting data into spreadsheets
- Formatting spreadsheets
- Charts
- Engineering problem solving
- Printing

T6 Databases encompassing:

- Features and purpose of database
- Searching existing database
- Creating a simple database
- Manipulating data in a database
- Advance sort functions
- Reports

T7 Transferring Data Between Windows Applications encompassing:

- Moving data between Word, Excel and Access

T8 Drawing and Computer Assisted Design (CAD) programs encompassing:

- Computer drawing using applications such as Visio.
- Incorporation of electrical/electronic symbols into computer drawings.

T9 E-mail and Internet Browsers encompassing:

- Browsers
- Search Engines
- Web-based e-mail (e.g. Hotmail)
- Application-based e-mail (e.g. Outlook).

Evidence Guide

EVIDENCE GUIDE

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EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Use engineering applications software as described in 8) and including:

A Following application instructions to input and output information.

B Storing information appropriately.

C Outputting information to a printer.

D Transferring information between systems.

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E	Saving, storing and backing up files for effective retrieval by others.
F	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

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.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using engineering application software.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

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Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to using at least two of the following types of engineering applications at a basic level.

- Office Applications
- Computer Aided Design
- Engineering data analysis software
- Engineering modelling
- Project management
- Network simulator
- Protocol analyser

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

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Competency Field

Competency Field **11)**

Computer Systems

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UEENEED117A Install and configure network systems for internetworking

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This competency standard unit covers the interconnection of networks. It encompasses safe working practice, basic installation and configuration of routers and documenting installation and configuration activities.

Note:
This unit applies to all aspects of Electrotechnology - engineering applications only. For general competencies related Information Technologies refer to the latest endorsed IT Training Package.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships

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License to practice **3)**

and the like.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	5	Writing	5	Numeracy	5

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to install and configure internetworking systems.	1.1	OHS processes and procedures for a given work area are obtained and understood.
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3	The extent of internetworking to be installed and configured is determined from internetworking performance specifications and in consultations with relevant persons.
		1.4	Media and software required for internetworking is selected in accordance with organisation's established procedures.
		1.5	Network cabling test reports are obtained and reviewed to determine whether it complies with the required regulatory and performance standard.
		1.6	Activities are planned to meet scheduled timelines in consultation with others involved on the work.
		1.7	Appropriate development tools and software are selected based on specified requirements and performance standard.
		1.8	Strategies are implemented to ensure network development is carried out efficiently.
2	Install and configure internetworking	2.1	OHS risk control measures and procedures for

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ELEMENT	PERFORMANCE CRITERIA	
systems.		carrying out the work are followed.
	2.2	Knowledge of internetworking arrangements, subnetting and routing protocols are applied to installing and configuring routers and TCP/IP addresses.
	2.3	Routing protocols are selected and configured as per requirements specified for the internetworking systems.
	2.4	Common routing, TCP/IP and access malfunctions are identified and rectified using known solutions drawing knowledge of basic internetworking arrangements and protocol.
	2.5	Approaches to issues/problems are analysed to provide most effective solutions.
	2.6	Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3 Report install and configuring of internetworking systems.	3.1	Written justification is made for internetworking installation and configuring activities and appropriate person/s notified in accordance with established procedures.
	3.2	Network services records are maintained in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and configuring networking systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ED117A Internet Networks

Evidence shall show an understanding of network basics to an extent indicated by the

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REQUIRED SKILLS AND KNOWLEDGE

following aspects:

T1 Calculate subnet addresses and masks

T2 Layer 3 and 4 Protocols

T3 Static and dynamic routing

T4 Basic Router Configuration

T5 Router Security

T6 Router Boot Sequence

T7 Router operating system management

T8 Password Recovery

T9 Router components and interfaces

T10 Troubleshooting at all layers

T11 Interior and Exterior routing protocols

T12 Distance vector routing protocols

T13 Link state routing protocols

T14 Routing tables

T15 Metrics used by routing protocols to find routes

T16 Advantages and disadvantages of distance vector and link state routing protocols

T17 Route summarisation

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

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Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with

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the "Assessment Guidelines – UEE11". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements; and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install and configure networking systems as described in 8) and including:

A Establishing the extent of internetworking installation.

B Selecting appropriate internetworking media and software.

C Determining whether network cabling is compliant.

D Installing and configuring basic routing and TCP/IP protocols.

E Calculate variable length subnet mask as per requirements specified for the internetworking systems.

F Identifying common routing, TCP/IP and access malfunctions.

G Applying known solutions to common routing,

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	TCP/IP and access malfunctions.
H	Documenting internetworking installation and configuration activities.
I	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above in context of and specific resources for assessment, evidence should show demonstrated competency in installing and configuring networking systems.

Method of assessment

9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit

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applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to installing and configuring internetworking systems between two Local Area Networks (LANs) to form a Wide Area Network (WAN) or a LAN and the Internet.

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Computer Systems

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UEENEEE083A Establish and follow a competency development plan in an electrotechnology engineering discipline

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers establishing and following a plan for one's own competency development. It encompasses establishing a plan in consultation with the enrolling registered training organisation (RTO), following industry/enterprise procedures regarding how work is conducted, understanding responsibilities and obligations under competency development plan, following activities for developing competency, pursuing opportunities to develop competencies, to self-monitoring competency development and meeting obligations for periodic reporting of competency development activities.

Application of the Unit

Application of the Unit **4**)

This unit applies to a recognised development program that leads to the acquisition of a formal award at AQF level 6

Licensing/Regulatory Information

1.2) **License to practice**

The skills and knowledge described in this unit require a licence to practise in the workplace subject to regulations for undertaking of electrical work. Practice in workplace and during training is also subject to regulations directly related to

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1.2) License to practice

occupational health and safety and where applicable a contracts of training.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Establish a	1.1 A competency development plan incorporating course

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ELEMENT	PERFORMANCE CRITERIA	
competency development plan		work, assessment scheme and workplace activities is established in consultation with the enrolling RTO.
	1.2	Obligations and expectations of the competency development plan are obtained and understood.
2 Comply with engineering industry/enterprise workplace policies and procedures	2.1	Industry/enterprise workplace policies and procedures for all work activities are obtained and understood.
	2.2	Work instructions are followed, any clarification involved being sought from the immediate supervisor/appropriate person.
	2.3	Unexpected situations are dealt with safely and in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person.
3 Monitor and respond to a personal competency development plan.	3.1	All aspects of the competency development plan are confirmed in consultation with appropriate persons.
	3.2	All components of the competency development plan are followed diligently.
	3.3	Opportunities to practise skills and apply knowledge relative to a particular competency are pursued.
	3.4	Assistance is sought from appropriate persons to overcome difficulties in developing skills and applying knowledge relevant to a particular competency.
	3.5	Progress in competency development is self-monitored against the competency development plan and industry/enterprise policies and procedures.
	3.6	Modifications to the personal competency development plan are made in consultation with appropriate persons.
	3.7	Obligations are met for the regular and accurate reporting of competency development activities as per industry/enterprise policies and procedures.
	3.8	Periodic competency development activities report is validated by an appropriate person in accordance with industry/enterprise policies and procedures.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and participating in development and following a personal competency development plan.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE083A Engineering competency development

Evidence shall show an understanding of engineering competency development to an extent indicated by the following aspects:

T1 Components of a competency development plan encompassing:

- Competencies to be achieved
- Course work and timetable
- Assessment scheme
- Aspects of competency to be developed in the workplace
- Methods of monitoring and recording relevant workplace activities.

T2 Obligations and expectations under a competency development plan

T3 Scope for industry/enterprise policies and procedures

- Policies and procedure related to safety, effective work outcomes, customer relations, conflict resolution and competency development.
- Monitoring and reporting work activities.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1**)

Longitudinal competency development approaches to assessment,

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EVIDENCE GUIDE

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Participate in electrical work and competency development activities as described in 8) including:

  A Establishing a competency development plan in consultation with the enrolling Registered Training Organisation (RTO).

  B Understanding obligations and expectations of the competency development plan.

  C Understand industry/enterprise workplace policies and procedures

  D Following work instructions and seeking clarification of how particular work is to be carried out and the procedures involved.

  E Dealing with unexpected situations in accordance with industry/enterprise policies and procedures, and with the approval of an authorised person

  F Reporting periodically the competency development activities in accordance with requirements

  G Periodically reviewing progress of the competency development activities in accordance with requirements

  H Pursuing strategies to develop opportunities for gaining

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the range of workplace experiences and exposure

I Progressing successfully against periodic or staged evaluative performance events

G Seeking assistance to overcome difficulties in developing competency

K Dealing with unplanned events.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to participating in development and following a personal competency development plan.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and

9.5)

This unit shall be assessed concurrently with other units in a

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relationship with other units	qualification.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to other units in an advance diploma qualification to contribute the evidence used in evaluating when competency has been sufficiently demonstrated. The unit applies to both the educational program provided by a registered training organisation and real work under a formal training agreement.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

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Custom Content Section

Competency Field **5)**

Commercial

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UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit specifies the mandatory requirements of occupational health and safety and how they apply to the various electrotechnology work functions. It encompasses responsibilities for health and safety, risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2**)

2.1) **Competencies**

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3**)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4**)

This unit addresses information, processes and techniques for the application of general occupational health and safety requirements in workplaces and is essential for employees without managerial or supervisory responsibilities

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to enter a	1.1 Work area access permits are obtained from appropriate personnel according to established

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ELEMENT	PERFORMANCE CRITERIA	
work area		procedures
	1.2	Safe work methods for controlling risk obtained, read and understood prior to undertaking a work activity.
	1.3.	Preparations for electrical and non-electrical isolation are carried out to prevent creation of hazards from loss of machine/system/process control according to established procedures.
	1.4	Tools and equipment needed for the work are checked for safety and correct functionality according to established procedures and regulatory requirements.
2 Apply safe working practices.	2.1	Safe work methods for controlling risk are followed accurately.
	2.2	Workplace procedures for dealing with accidents, fires and emergencies are followed according to work procedures and scope of responsibility and competencies.
3. Follow workplace procedures for hazard identification and risk control	3.1	Hazards are identified and control measures implemented and monitored through active participation in the consultation process with employer and other employees.
	3.2	Hazards in the work area are recognised and reported to appropriate personnel according to established procedures.
	3.3	OHS records of incidents are completed in accordance with regulatory requirements and established procedures.
	3.4	Workplace instructions and training are followed accurately within established procedures.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying OHS practices in the workplace.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE101A Occupational Health and Safety principles

Evidence shall show an understanding of Occupational Health and Safety to an extent indicated by the following aspects

T1 The basic legal requirements covering occupational health and safety in the workplace encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- 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

T2 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 OH&S 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.
- Importance of safe premises, buildings and security in an industrial setting and the consequences of non- compliance.
- standard work procedure.

T3 Manual Handling encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T4 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 and interpretation of material safety data sheet (MSDS)

T5 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 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.

T6 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

T7 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

T8 Working safely with electricity encompassing:

- effects of electric shock on the human body

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REQUIRED SKILLS AND KNOWLEDGE

- common causes of electrical accidents
- precautions that can minimise the chance of electric shock (earthing, extra low voltage, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T9 Life support - 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 cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (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

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over

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EVIDENCE GUIDE

time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able

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EVIDENCE GUIDE

to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement encompassing:
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Applying OHS practices in the workplace as described in 8) and including:

A Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.

B Understanding and following risk control safe work methods.

C Applying work procedures and instructions as they apply to risk control measures.

D Dealing with accidents and emergencies within the scope of responsibility.

E Participation in consultation processes, identifying hazards and implementing and monitoring control measures.

F Dealing with unplanned events

Note:
Ability to implement these Occupation Health and Safety

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EVIDENCE GUIDE

measures shall be demonstrated on all occasions safety issues arise.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to applying OHS practices in the workplace.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

This unit shall be assessed concurrently, as it relates to other units undertaken in a possible skill clusters or qualification.

Components of this unit are included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired

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Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to each of the following

- Relevant Occupational Health and Safety legislation, regulations and codes of practice related to hazards present in the industry and particular workplace
- Accepted industry work procedures and the specific safety procedures and work instructions for particular workplace.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Custom Content Section

Competency Field 5)

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Competency Field 5)

Electrotechnology

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UEENEEE102A Fabricate, assemble and dismantle utilities industry components

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers basic fitting and fabrication techniques as they apply in the various utilities industry work functions. It encompasses the safe use of hand, fixed and portable power tools; cutting, shaping joining and fixing using metallic and non-metallic materials; dismantling and assembling equipment; basic mechanical measurement and marking-out and reading drawings/diagrams.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to persons entering work in utilities industry and may be used in school-based vocational programs.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe
the essential

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outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare for dismantling, assembling and fabrication work.	1.1 OHS procedures for a given work area are obtained and understood through established routines and procedures.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazard not previously identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature of the work is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6 Materials required for the work are obtained in accordance with established routines and procedures.
	1.7 Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety.
	1.8 Cutting tools such as drills and chisels are sharpened to suit the material on which they are to be used.
2 Dismantle and assemble utilities industry apparatus.	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.3 Appropriate tools are selected and used correctly and safely in dismantling and assembling apparatus.
	2.4 Manufacturer apparatus dismantling and assembling guides are used where applicable.

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ELEMENT		PERFORMANCE CRITERIA	
		2.5	Components are marked or tagged during the dismantling to help ensure correct and efficient reassembly.
		2.6	Dismantled components and parts are stored to protect them against loss or damage.
		2.7	Apparatus is dismantled and assembled efficiently without waste of materials and energy and/or damage to apparatus and the surrounding environment or services.
		2.8	Procedures for referring non-routine events to immediate supervisor for directions are followed.
		2.9	Routine quality checks are carried out in accordance with work instructions.
		2.10	OHS risk control work completion measures and procedures are followed.
		2.11	Work site is cleaned and made safe in accordance with established procedures.
		2.12	Work supervisor is notified of the completion of the work in accordance with established procedures.
3	Fabricate utilities industry components.	3.1	Established OHS risk control measures and procedures for carrying out the work are followed.
		3.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		3.3	Appropriate tools are selected and used correctly and safely in fabricating components.
		3.4	Drawings and instruction for the fabrication of components are followed.
		3.5	Component dimensions are determined directly or by calculation from information given in job drawings and instructions.
		3.6	Components are fabricated efficiently without waste of materials and energy and/or damage to the surrounding environment or services.

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ELEMENT	PERFORMANCE CRITERIA	
	3.7	Procedures for referring non-routine events to immediate supervisor for directions are followed.
	3.8	Routine quality checks are carried out in accordance with work instructions.
	3.9	OHS risk control work completion measures and procedures are followed.
	3.10	Work site is cleaned and made safe in accordance with established procedures.
	3.11	Work supervisor is notified of the completion of the work in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fabricating, dismantling, assembling of utilities industry components.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE102A Hand and power tools and their application

Evidence shall show an understanding of hand and power tools and their application to an extent indicated by the following aspects:

T1 Mechanical drawing interpretation and sketching encompassing:

- drawing standards and conventions used in drawings of mechanical components as specified in AS1100
- basic 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, 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

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REQUIRED SKILLS AND KNOWLEDGE

T2 Workshop planning and materials encompassing:

- methods used to work safely in an industrial work environment.
- typical non-electrical hazards in the workplace
- control measures for dealing with hazards identified.
- Conducting a risk assessment on a given work environment, documenting and assessing the risks identified
- type of metallic and non-metallic materials used in the electrotechnology industry and application of the common materials
- planning process

T3 Measuring and marking out encompassing:

- reasons for measuring and marking out
- tools used for marking out
- measuring and marking out a project accurately following correct procedures.
- sustainable energy work practices related to reducing waste when marking out.

T4 Holding and cutting encompassing:

- common tools for holding (bench vices, multi-grips, vice grips, wrenches).
- common tools for cutting metallic and non-metallic material (hacksaws, wood saws, chisels, pliers, files)
- procedure for using a range of tools for cutting, shaping, and finishing metallic and non-metallic materials
- safety procedures when using holding and cutting tools

T5 Drills and drilling encompassing:

- types of drills used in the electrotechnology industry
- sharpening twist drills
- drilling metallic and non-metallic components
- safe use of a bench drill

T6 Tapping and threading encompassing:

- type and size of commonly used threads used in electrotechnology work
- taps and tap wrenches
- tapping metallic and non-metallic components
- stock and die tools
- threading metallic and non-metallic components

T7 General Hand Tools encompassing:

- hammers used in electrotechnology work
- screwdrivers used in electrotechnology work
- spanners and sockets used in electrotechnology work
- pliers used in electrotechnology work
- assembling components applicable to electrotechnology industry using a variety of

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REQUIRED SKILLS AND KNOWLEDGE

hand tools.

T8 Joining techniques encompassing:

- types of machine screws and nuts
- forms of welding (Oxy-acetylene, electric arc welding).
- forms of brazing and hard soldering
- process of soft soldering
- joining components using machine screws
- joining components using welding, brazing or soldering techniques

T9 Portable electric power tools encompassing:

- portable electric power tools (grinders, drills, jigsaws, saws)
- applications of portable electric power tools used in the electrotechnology work.
- using portable power tools.
- fabricating components using power tools (drills, grinders)

T10 Sheet metal work encompassing:

- types of sheet metal materials used in the electrotechnology work.
- names and applications of the types of fabrication materials.
- tools used with sheet metals in electrotechnology work (hacksaw, tinsnips, guillotines, punches, notching tools, folding machines)
- techniques used in fabricating sheet metal (cutting, bending, drilling/punching, joining, 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.
- fabricating components using sheet metal and fabrication tools.

T11 Low tolerance measurement encompassing:

- tolerance
- techniques in using vernier callipers
- techniques in using micrometers.
- using vernier callipers to measure engineering components
- using micrometers to measuring engineering components

T12 Dismantling and assembly techniques encompassing:

- tools used in dismantling and assembling electrotechnology equipment (spanners, screwdrivers, bearing pullers, etc).
- procedures for ensuring the safe treatment of dismantled components.
- 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.

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Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.**1**)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the

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EVIDENCE GUIDE

Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Fabricate, dismantle, assemble of utilities industry components as described in 8) and including:

    A Selecting and using hand tools appropriate to a task correctly and safely

    B Selecting and using power tools appropriate to a task correctly and safely

    C Sharpening at least two drill bits each for use different types of material.

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EVIDENCE GUIDE

D Interpreting mechanical drawings/diagrams and instructions correctly.

E Dismantle and assemble an apparatus relevant to utilities industry discipline in which competency is sought.

F Fabricate a component relevant to the utilities industry discipline in which competency is sought.

G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to dismantling, assembling and fabricating utilities industry components.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

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EVIDENCE GUIDE

assessment and relationship with other units	For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance, repair or development work functions in any of the following disciplines:

- Electrotechnology Disciplines
- Gas industry Disciplines
- ESI Transmission, Distribution and Rail Disciplines
- ESI Generation Disciplines

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.3) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

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2.3) Literacy and numeracy skills

Competency Field **5)**

Utilities industry

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UEENEEE103A Solve problems in ELV single path circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers providing known solutions to predictable problems in single path circuits operated at extra-low voltage (ELV) as they apply to various energy sector work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable circuit problems.

Application of the Unit

Application of the Unit **2)**

This unit shall apply to persons entering work in the energy sector and may be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the

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Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to work on extra-low voltage single path electrical circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem 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 that may be required for the work are identified and accessed in accordance with established 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 problem in extra-low voltage single path electrical circuits.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established routines are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits.
	2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment

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ELEMENT	PERFORMANCE CRITERIA	
		or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established routine procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage single path circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE103A Single Path d.c. Circuits

Evidence shall show an understanding of single path d.c. circuits to an extent indicated by the following aspects:

T1 Basic electrical concepts encompassing:

- electrotechnology industry
- 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, velocity and speed with relationship to the generation and transportation of electricity.

T2 Basic electrical circuit encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T3 Ohm's Law encompassing:

- basic 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

T4 Electrical power encompassing:

- relationship between force, power, work and energy
- power dissipated in circuit from voltage, current and resistance values
- power ratings of devices
- measurement electrical power in a d.c. circuit
- effects of power rating of various resistors

T5 Effects of electrical current encompassing:

- physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect
- basic principles by which electric current can result in the production of heat; the production of magnetic fields; a chemical reaction
- typical uses of the effects of current
- mechanisms by which metals corrode
- fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current

T6 EMF sources energy sources and conversion electrical energy encompassing:

- basic principles of producing a 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 a emf by the application of sun light falling on the surface of photovoltaic cells
- basic principles of generating a emf when a mechanical force is applied to a crystal (piezo electric effect)
- principles of producing a electrical current from primary, secondary and fuel cells

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REQUIRED SKILLS AND KNOWLEDGE

- input, output, efficiency or losses of electrical systems and machines
- effect of losses in electrical wiring and machines
- principle of conservation of energy

T7 Resistors encompassing:

- features of fixed and variable resistor types and typical applications
- identification of fixed and variable resistors
- various types of fixed resistors used in the Electro technology Industry. e.g. wire-wound, carbon film, tapped resistors.
- various types of variable resistors used in the Electro technology Industry e.g. adjustable resistors: potentiometer and rheostat; light dependent resistor (LDR); voltage dependent resistor (VDR) and temperature dependent resistor (NTC, 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, temperature conditions.
- specifying a resistor for a particular application.

T8 Series circuits encompassing:

- 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 Electro technology industry.
- characteristics of a 'series' circuit - connection of loads, current path, voltage drops, power dissipation and affects 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.
- setting up and connecting a single-source series dc circuit
- measurement of resistance, voltage and current values in a single source series circuit
- effect of an open-circuit on a series connected circuit

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Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in extra-low voltage single path circuits as described in 8) and including:

A Determining the operating parameters of an existing circuit.

B Altering an existing circuit to comply with specified operating parameters.

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C	Developing circuits to comply with a specified function and operating parameters.
D	Identifying loss of supply.
E	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solve problems in extra-low voltage single path circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended

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for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Single source single path circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:
  - Computers
  - Data Communications
  - Electrical
  - Electronics
  - Fire protection
  - Instrumentation
  - Refrigeration and Air Conditioning,
  - Renewable and sustainable energy systems, and
  - Security technology
- In relation to at least three of the following types of circuit problems and on at least two occasions:
  - Determining the operating parameters of an existing circuit
  - Identifying and locating open-circuits
  - Identifying and locating short-circuits

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RANGE STATEMENT

- Identifying loss of supply

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEE104A Solve problems in d.c. circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers determining correct operation of single source d.c. series, parallel and series-parallel circuits and providing solutions as they apply to various electrotechnology work functions. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in single and multiple path circuits.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe

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the essential outcomes
of a unit of competency

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to work on d.c. electrical circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work preparation measures and procedures are followed.
		1.3	The nature of the circuit problem 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 that may be required for the work are identified and accessed in accordance with established 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 d.c. circuit problems.	2.1	OHS risk control work measures and procedures are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Established methodological techniques are used to solve d.c. circuit problems from measure and calculated values as they apply to electrical circuit.
		2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.

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ELEMENT	PERFORMANCE CRITERIA	
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in d.c. circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE104A Direct current circuits

Evidence shall show an understanding of electrical fundamentals and direct current multiple path circuits to an extent indicated by the following aspects:

T1 Basic electrical concepts encompassing:

- electrotechnology industry
- 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, velocity and speed with relationship to the generation and transportation of electricity.

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REQUIRED SKILLS AND KNOWLEDGE

T2 Basic electrical circuit encompassing:

- 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

T3 Ohm's Law encompassing:

- basic 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

T4 Electrical power encompassing:

- relationship between force, power, work and energy
- power dissipated in circuit from voltage, current and resistance values
- power ratings of devices
- measurement electrical power in a d.c. circuit
- effects of power rating of various resistors

T5 Effects of electrical current encompassing:

- physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect
- basic principles by which electric current can result in the production of heat; the production of magnetic fields; a chemical reaction
- typical uses of the effects of current
- mechanisms by which metals corrode
- fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current

T6 EMF sources energy sources and conversion electrical energy encompassing:

- basic principles of producing a 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 a emf by the application of sun light falling on the surface of photovoltaic cells
- basic principles of generating a emf when a mechanical force is applied to a crystal

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REQUIRED SKILLS AND KNOWLEDGE

(piezo electric effect)

- principles of producing a 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

T7 Resistors encompassing:

- features of fixed and variable resistor types and typical applications
- identification of fixed and variable resistors
- various types of fixed resistors used in the Electro technology Industry. e.g. wire-wound, carbon film, tapped resistors.
- various types of variable resistors used in the Electro technology Industry e.g. adjustable resistors: potentiometer and rheostat; light dependent resistor (LDR); voltage dependent resistor (VDR) and temperature dependent resistor (NTC, 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, temperature conditions.
- specifying a resistor for a particular application.

T8 Series circuits encompassing:

- 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 Electro technology industry.
- characteristics of a 'series' circuit - connection of loads, current path, voltage drops, power dissipation and affects 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.
- setting up and connecting a single-source series dc circuit
- measurement of resistance, voltage and current values in a single source series circuit
- effect of an open-circuit on a series connected circuit

T9 Parallel circuits encompassing:

- schematic diagram of a single-source d.c. 'parallel' circuit.
- major components of a 'parallel' circuit (power supply, loads, connecting leads and

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REQUIRED SKILLS AND KNOWLEDGE

switch)
- applications where ‘parallel’ circuits are used in the Electrotechnology industry.
- characteristics of a ‘parallel’ circuit. (load connection, current paths, voltage drops, power dissipation, affects 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 network.
- calculation of the total resistance of a ‘parallel’ circuit.
- calculation of the total current of a ‘parallel’ circuit.
- Calculation of the total voltage and the individual voltage drops of a ‘parallel’ circuit.
- 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.

T10 Series/parallel circuits encompassing:

- schematic diagram of a single-source d.c. ‘series/parallel’ circuit.
- major components of a ‘series/parallel’ circuit (power supply, loads, connecting leads and switch)
- 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, affects 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.
- calculation of the total current of a ‘series/parallel’ circuit.
- calculation of the total voltage and the individual voltage drops of a ‘series/parallel’ circuit.
- 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

T11 Factors affecting resistance encompassing:

- 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.

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REQUIRED SKILLS AND KNOWLEDGE

- effects of temperature change on the resistance of various conducting materials
- effects of resistance on the current-carrying capacity and voltage drop in cables.
- 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, tungsten) when those materials undergo a change in type of material length, cross-sectional area and temperature.

T12 Effects of meters in a circuit encompassing:

- selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application.
- measuring resistance using direct, volt-ammeter and bridge methods.
- instruments used in the field to measure voltage, current, resistance and insulation resistance and the typical circumstances in which they are used.
- hazards involved in using electrical instruments and the safety control measures that should be taken.
- operating characteristics of analogue and digital meters.
- correct techniques to read the scale of an analogue meters and how to reduce the ‘parallax’ error.
- types of voltmeters used in the Electrotechnology industry – bench type, clamp meter, Multimeter, etc.
- purpose and characteristics (internal resistance, range, loading effect and accuracy) of a voltmeter.
- types of voltage indicator testers. e.g. LED, neon, solenoid, volt-stick, series tester, etc. and explain the purpose of each voltage indicator tester.
- operation of various voltage indicator testers.
- advantages and disadvantages of each voltage indicator tester.
- various types of ammeters used in the Electrotechnology industry – bench, clamp meter, multimeter, etc.
- purpose of an ammeter and the correct connection (series) of an ammeter into a circuit.
- reasons why 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.
- selecting an appropriate meter in terms of units to be measured, range, loading effect and accuracy for a given application
- connecting an analogue/digital voltmeter into a circuit ensuring the polarities are correct and take various voltage readings.
- loading effect of various voltmeters when measuring voltage across various loads.
- using voltage indicator testers to detect the presence of various voltage levels.
- connecting analogue/digital ammeter into a circuit ensuring the polarities are correct and take various current readings.

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REQUIRED SKILLS AND KNOWLEDGE

T13 Resistance measurement encompassing:

- Identification of instruments used in the field to measure resistance (including insulation resistance) and the typical circumstances in which they are used.
- the purpose of an Insulation Resistance (IR) Tester.
- the parts and functions of various analogue and digital IR Tester (selector range switch, zero ohms adjustment, battery check function, scale and connecting leads).
- reasons why the supply must be isolated prior to using the IR tester.
- where and why the continuity test would be used in an electrical installation.
- where and why the insulation resistance test would be used in an electrical installation.
- the voltage ranges of an IR tester and where each range may be used. e.g. 250 V d.c, 500 V d.c and 1000 V d.c
- AS/NZS3000 Wiring Rules requirements – continuity test and insulation resistance (IR) test.
- purpose of regular IR tester calibration.
- the correct methods of storing the IR tester after use
- carry out a calibration check on a IR Tester
- measurement of low values of resistance using an IR tester continuity functions.
- measurement of high values of resistance using an IR tester insulation resistance function.
- volt-ammeter (short shunt and long shunt) methods of measuring resistance.
- calculation of resistance values using voltmeter and ammeter reading (long and short shunt connections)
- measurement of resistance using volt-ammeter methods

T14 Capacitors and Capacitance encompassing:

- basic construction of standard capacitor, highlighting the: plates, dielectric and connecting leads
- different types of dielectric material and each dielectric's relative permittivity.
- identification of various types of capacitors commonly used in the Electrotechnology industry (fixed value capacitors -stacked plate, rolled, electrolytic, ceramic, mica and Variable value capacitors – tuning and trimmer)
- circuit symbol of various types of capacitors: standard; variable, trimmer and polarised
- terms: Capacitance (C), Electric charge (Q) and Energy (W)
- unit of: Capacitance (Farad), Electric charge (Coulomb) and Energy (Joule)
- factors affecting capacitance (the effective area of the plates, the distance between the plates and the type of dielectric) and explain how these factors are present in all circuits to some extent.
- how a capacitor is charged in a d.c. circuit.
- behaviour of a series d.c. circuit containing resistance and capacitance components. - charge and discharge curves

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REQUIRED SKILLS AND KNOWLEDGE

- the term ‘Time Constant’ and its relationship to the charging and discharging of a capacitor.
- calculation of quantities from given information: Capacitance (Q = VC); Energy (W =½CV2); Voltage (V = Q/C)
- calculation one time constant as well as the time taken to fully charge and discharge a given capacitor. ($\tau = RC$)
- connection of a series d.c. circuit containing capacitance and resistor to determine the time constant of the circuit

T15 Capacitors in Series and Parallel encompassing:

- 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
- factors which determine the capacitance of a capacitor and explain how these factors are present in all circuits to some extent.
- 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.
- Connecting capacitors in series and/or parallel configurations to achieve various capacitance values.
- common faults in capacitors.
- testing of capacitors to determine serviceability.
- application of capacitors in the Electrotechnology industry.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form

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EVIDENCE GUIDE

that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solving problems in d.c. circuits as described in 8) and including:

    A Using methodological techniques to solve d.c. circuit problems from measure and calculated values

    B Determining the operating parameters of an existing circuit.

    C Altering an existing circuit to comply with specified operating parameters.

    D Developing circuits to comply with a specified function and operating parameters.

    E Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

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Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in d.c. circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to single source series, parallel and series-parallel d.c. circuits as they apply to problems related to installation, fault finding, maintenance or development work functions and at least two of the following types of circuit problems and on more than one occasions:

- 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

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RANGE STATEMENT

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrotechnology

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UEENEEE105A Fix and secure electrotechnology equipment

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers fixing, securing and mounting techniques as apply in the various electrotechnology work functions. It encompasses the safe use of hand and portable power tools, safe lifting techniques, safe use of ladders and elevated platforms and the selection and safe application of fixing devices and supporting accessories/equipment.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe
the essential outcomes

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of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to fix and secure equipment.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The scope of work to be undertaken is obtained from documentation or from work supervisor.
	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 identified and accessed in accordance with established procedures.
	1.6 Fixing devices are selected for their suitable ability for the environment, the load they are to support and substratum's into which they are to be installed.
	1.7 Supporting accessories/equipment is selected for suitability for the environment and ability to support and protect from damage that which they are intended to support.
	1.8 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Install fixing and support devices.	2.1 Electrical isolation is arranged where work is within arm's reach of exposed conductive parts, plant or machinery in strict accordance OHS requirements and procedures.
	2.2 Other OHS risk control measures relevant to the work site are followed.
	2.3 Fixing devices are installed in accordance with manufacturer instructions.
	2.4 Support accessories/equipment is install accurately

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ELEMENT	PERFORMANCE CRITERIA	
		and to comply with technical standards and job specifications.
	2.5	Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
3 Complete fixing and support work.	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Work site is tidied and tools and equipment cleaned and securely stored.
	3.3	Appropriate personnel are notified of the work completion.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and fixing and securing equipment.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE105A Fixing and support devices/techniques

Evidence shall show an understanding of accessories and support and fixing device and methods and their use to an extent indicated by the following aspects:

T1. Device for securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to hollow walls encompassing:

- types and safe application of devices for hollow wall fixing and support
- methods/techniques used to fix/support to wood, hollow wall, masonry blocks, plasterboard, panelling
- types and safe application of fixing devices used in the electrotechnology industry for wood and hollow wall structures (wood screws, coach bolts, self-tappers, self drilling, metal thread, hollow wall anchors, behind plaster brackets, stud brackets,

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REQUIRED SKILLS AND KNOWLEDGE

plasterboard devices, toggle devices)
- types of tools used for hollow wall fixing and supporting.
- using various fixing methods to fix/support to hollow walls.

T2. Device for securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to solid walls encompassing:

- types and safe application of devices used for solid wall fixing and support
- methods/techniques used in to fix to masonry and concrete structures
- fixing devices used in the electrotechnology industry for solid wall structures (wall-plugs, expanding concrete fixing devices, gas powered fixing tools, powder actuated fixing tools, loxins, dynabolts, chemical devices)
- regulatory requirements for use of powder fixing tools.
- hand and power tools used in fixing and supporting accessories
- using various fixing methods to fix/support to solid walls

T3. Device for securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to metal fixing encompassing:

- accessories that may be fixed to metal (saddle clips, conduits, brackets, switches)
- techniques for fixing to metal
- fixing devices: coach bolts, self-tappers, metal thread bolts, hollow wall anchors, rivets
- fixing tools - spanners, screwdrivers, power screw drivers, pop riveters, files, reamers
- OH&S issues related to drilling, cutting, eye protection, metal filings, swarf, noise
- Using power drills, drill bits, change drill speeds.
- Install a fixing device and accessory capable of supporting up to 20 kg on the metal plate.

T4. Securing and mounting electrical/electronic/instrumentation/refrigeration/ air-conditioning/telecommunications accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories using fixing adhesives and tapes encompassing:

- types and safe application of using adhesives and tapes as fixing devices (load limits of different commercial products)
- accessories that may be fixed using adhesives and tapes
- techniques for the application of adhesives and tapes
- tools used to apply and cut adhesives and tapes
- hazards and safety measures when working with adhesives and chemical fixing devices (fumes, cutting, eye protection, physical contact, hand protection, ingestion)

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Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the

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EVIDENCE GUIDE

Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Fix and secure electrical equipment as described in 8) and including:

    A Selecting fixing for loads of < 5 kg, < 20 kg and < 50 kg and suitable for the environment in which they are to be installed.

    B Installing fixing devices in compliance with manufacturers instructions

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EVIDENCE GUIDE

C Installing appropriate devices for fixing to a hollow wall, brick, concrete and steel.

D Installing fixing support accessories/equipment relevant the discipline in which competency is sought.

E Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to fixing and securing electrical equipment.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with

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EVIDENCE GUIDE

units covering other installation competencies.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

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Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrotechnology

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UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers the use of drawings, diagrams, cable schedules, standards, codes and specifications as they apply to the various electrotechnology work functions. It encompasses the rudiments for communicating with schematic, wiring and mechanical diagrams and equipment and cable/connection schedules, manuals, site and architectural drawings and plans showing the location of services, apparatus, plant and machinery and understanding the use and format of compliance standards and job specifications.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) **License to practice**

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to use drawings, diagrams, schedules and manuals.	1.1	Established OHS risk control measures and procedures are followed.
		1.2	The need for drawings, diagrams, schedules or manuals is determined from the nature of the work to be undertaken.
		1.3	Established routines and procedures are followed to obtain drawings, diagrams, schedules or manuals required for the work to be undertaken.
2	Use drawings, diagrams, schedules and manuals to obtain job information.	2.1	Drawings, diagrams, schedules and/or manuals are selected, appropriate to the work being undertaken.
		2.2	Drawings, diagrams and schedules are interpreted using knowledge of drawing layouts, conventions and symbols.
		2.3	Dimensions are extracted from drawings and diagrams for application to work undertaken.
		2.4	Location of equipment is determined from equipment schedules and location diagrams.
		2.5	Manuals are reviewed to ascertain their format and where information relevant to the work to be undertaken is located.
		2.6	Information given in manuals is interpreted in relation to the work to be undertaken.
3	Use drawings, diagrams, schedules and manuals to	3.1	Drawing conventions are used in neat freehand drawings to convey information and ideas to others involved in the work to be undertaken.

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ELEMENT	PERFORMANCE CRITERIA	
convey information and ideas.	3.2	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 person(s) in accordance with established procedures.
4 Prepare to use compliance standards, codes and specifications.	4.1	Compliance Standards and Codes that apply to particular disciplines are sought and obtained.
	4.2	The format of compliance Standards and Codes that apply to particular disciplines are reviewed and understood.
	4.3	The purpose and format and typical content of job specifications are reviewed and understood.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using drawings, diagrams, cable schedules, standards, codes and specifications.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE107A Drawings, diagrams and schedules

Evidence shall show an understanding of drawings, diagrams and schedules used in electrotechnology work to an extent indicated by the following aspects:

T1 Architectural drawings encompassing:

- site plans, floor plans detailed drawings and standard drawings
- architectural floor plan to determine the power and lighting or communications / audio/ video layouts required in a domestic installation
- site plan to locate the service point, consumers 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.
- reading and interpretation of floor plans to determine the location of the electrical/

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REQUIRED SKILLS AND KNOWLEDGE

communication/audio accessories and appliances.

- Australian standard symbols used on floor plans to show the location of the accessories and appliances as detailed in an electrical schedule.

T2 Electrical drawings encompassing:

- 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.
- conventions used in and the features of circuit 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.

T3 Circuit diagrams encompassing:

- purpose of circuit diagrams in the electrotechnology industry
- conventions used in and the features of circuit diagrams
- sketching basic circuit diagrams
- common symbols used in circuit diagram (Australian Drawing Standard AS/NZS 1102)
- developing switching charts to identify the terminals of various types of switches
- connecting equipment using circuit diagrams.

T4 Wiring diagrams encompassing:

- purpose of wiring diagrams in the electrotechnology industry
- conventions used in and the features of wiring diagrams
- sketching basic wiring diagrams
- common symbols used in wiring diagram (Australian Drawing Standard AS/NZS 1102)
- connecting equipment using wiring diagrams.

T5 Building construction drawings and diagrams encompassing:

- building types: timber frame, brick veneer, double brick and metal frame.
- identification of different types of: footings, floors, external walls, roofs, 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

KS02-EE107A Introduction to regulations, compliance standards and codes

Evidence shall show an understanding of regulations, compliance standards and codes that apply to electrical work to an extent indicated by the following aspects:

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REQUIRED SKILLS AND KNOWLEDGE

T1 Regulation for undertaking electrical work encompassing:

- scope of work covered by licensing in the electrotechnology industry (Electrical licensing)
- legislative requirements for ensuring electrical or electronic equipment is safe i.e. compliance requirements of electrical installations

T2 Standards philosophy and format encompassing:

- 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 include 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 include those applicable to electrical safe working practices and some aspects of the Building Code of Australia.

T3 Purpose, format and content of typical job specifications encompassing:

- NATSPEC specification system - provide the most common templates on which job specification are written.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment

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intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as

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EVIDENCE GUIDE

specified in the performance criteria and range statement

- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Use drawings, diagrams, schedules, standards, codes and specifications as described in 8) Range and including:

    A Identifying drawings, diagrams, schedules and manuals relevant to the work to be undertaken.

    B Interpreting drawings, diagrams, schedules and manuals correctly.

    C Using correct conventions in freehand drawings.

    D Giving correct information in freehand drawings.

    E Obtaining compliance Standards and Codes applicable to particular disciplines

    F Reviewing and understanding the format of compliance Standards and Codes that apply to particular disciplines

    G Reviewing the format and content of typical job specifications.

    H Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment

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EVIDENCE GUIDE

environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using drawings, diagrams, schedules and manuals.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the use of drawings, diagrams, schedules, standards, codes or specifications is required.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to assembly, installation, fault finding, maintenance or development work functions in any of the following disciplines:

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RANGE STATEMENT

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation
- Refrigeration and Air Conditioning
- Renewable / sustainable energy, and
- Security technology

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Custom Content Section

Competency Field **5)**

Electrotechnology

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UEENEEE108A Lay wiring/cabling and terminate accessories for extra-low voltage (ELV) circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the laying of wiring/cabling, connection of accessories and continuity and insulation resistance testing of circuits intended to operate at extra-low voltage. Typically this includes circuits and accessories for ELV powered devices, security, controls, integrated systems, audio/video systems. It encompasses the principles of single source, single load power circuits, control circuits and communications circuits, safe working practices and following work processes that satisfy electrical principles for safety and functionality.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development in entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where

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License to practice **3)**

applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, and power operated tools, vehicles, road signage and traffic control, lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and

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Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to lay wiring/cabling and connect accessories for extra-low voltage circuits.	1.1 OHS procedures for a given work area are obtained and understood through established routines.
	1.2 Established OHS risk control measures in preparation for the work are followed.
	1.3 Safety hazards not previously identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature and location of the work is obtained from work supervisor or other appropriate person to establish the scope of work to be

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ELEMENT	PERFORMANCE CRITERIA	
		undertaken.
	1.5	Advice is sought from the work supervisor or other appropriate person to ensure the work is coordinated effectively with others.
	1.6	Sources of materials that may be required for the work are established in accordance with established routines.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Lay wiring/cabling and connect accessories for extra-low voltage circuits.	2.1	Established OHS risk control measures for carrying out the work are followed.
	2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.3	Wiring and accessories are installed to comply 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 manufacture’s specifications and regulatory requirements.
	2.6	Cables installed for future service and marked in accordance with the cable identification scheme and terminated incompliance with regulatory requirements.
	2.7	Procedures for referring non-routine events to immediate supervisor for directions are followed.
	2.8	Cable installation and termination is carried out efficiently without waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.

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ELEMENT	PERFORMANCE CRITERIA	
3 Complete and report work activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Work supervisor is notified of the completion of the installation work in accordance with established routines.

Required Skills and Knowledge

EQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and laying wiring/cabling and terminate accessories for extra-low voltage circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE108A Extra low voltage wiring

Evidence shall show an understanding of extra low voltage wiring cable protection and support method and accessories to an extent indicated by the following aspects:

T1 Cable protection and support method and accessories encompassing:

- 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.
- 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

T2 Types of cables used in the electrotechnology industry and their application encompassing:

- 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

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EQUIRED SKILLS AND KNOWLEDGE

- Typical characteristics and use of power circuit cables and control circuit cables

T3 Installing cables in buildings, structures and premises encompassing:

- 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

T4 Basic cable and conductor terminations encompassing:

- Insulation removal and replacement
- Conductor handling and cable terminations encompassing:
  - General aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes.
  - Application of connecting devices for conductors and terminals
  - Continuity through connections and insulation resistance testing
  - Stress release on cables/conductors.

T5 Technical standards, regulations and codes related to extra-low voltage work encompassing:

- Limitation imposed by regulations
- How to read and apply a standard
- Aspects of technical Standards that apply to extra-low voltage work

T6 Environmental and heritage regulation effecting electrotechnology work encompassing:

- Purpose of environmental and heritage regulation
- Typical issues affecting electrotechnology services and systems
- Meeting requirements

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

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Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all

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prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Lay wiring/cabling and terminate accessories for extra-low voltage in power and control circuits as described in 8) and including:

A	Understanding the nature of the work.
B	Selecting appropriate tools, cables and accessories.
C	Following appropriate cable routes.
D	Installing cable and accessories to requirements.
E	Terminating cables and accessories to manufacture's specifications and requirements.
F	Cleaning worksite.
G	Notifying completion of work using established procedures.

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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to laying wiring/cabling and terminate accessories for extra-low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with

9.5)

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other units

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to laying wiring/cabling and connecting accessories for extra-low voltage power and control cabling systems circuits using:

- At least one of the following wiring/cabling systems:
  - Unenclosed thermoplastic sheathed (TPS) cable
  - Enclosed thermoplastic insulated (TPI) or sheathed cables, and
- At least three of the following wiring/cabling systems:
  - single cable,
  - flexible cable,
  - flexible cord,
  - shielded cable,
  - ribbon cable,
  - other similar and like cable

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEE124A Compile and produce an energy sector detailed report

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers complying and producing an energy sector report. It encompasses determining the safety requirements are met and all regulatory responsibilities are adhered to. The person competent in this unit must demonstrate an ability to identify information sources and collect and analyse and format information applicable to the electrotechnology industry and produce a report as required.

Application of the Unit

Application of the Unit **2)**

This competency standard is suitable for employment-based programs under an approved contract of training at the AQF level of the qualification in which the unit is first packaged or higher.

The unit may be selected as an elective from the relevant schedule (see qualification packaging rules) provided that all prerequisite units are undertaken or addressed through recognition processes.

This unit may be included in a skill set provided that it is listed in the schedule of electives (see Qualification Framework) and all prerequisite units are undertaken or addressed through recognition processes.

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Delivery and assessment of this unit should be undertaken within regard to the requirements of License to Practice (1.2 above), Prerequisite Competencies and Literacy and Numeracy skills (2 above) and the recommendations for concurrent assessment and relationship with other units (9.5 below).

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.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, 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.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit.

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Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 5 Writing 5 Numeracy 5

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to develop a energy sector report.	1.1 OHS processes and procedures for a given work area are identified, obtained and understood.
	1.2 Established techniques for report writing are reviewed are adopted in accordance with

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ELEMENT		PERFORMANCE CRITERIA	
			organisation policies.
		1.3	The scope of the report is evaluated and report parameters established using a formal evaluation/survey processes.
		1.4	Criteria from other related works impacting on the report are determined from other sources.
		1.5	Identify source and availability of information.
2	Develop energy sector report.	2.1	Report is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.
		2.2	Report is developed in collaboration with all relevant personnel.
		2.3	Competent persons are identified to assist in the compilation of the report.
		2.4	Report is reviewed against all inputs and adjusted to rectify any anomalies.
		2.5	Compile report in accordance with organisation policies and procedures.
		2.6	Compile and analyse research report information
3	Obtain approval for final energy sector report.	3.1	Report is presented and discussed with person(s) of higher authority.
		3.2	Alterations to the report resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.
		3.3	Final report is presented and approval obtained from appropriate person(s).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and compiling and producing an electrotechnology report.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE124A Energy sector detailed report writing

Evidence shall show an understanding of analysis, decision making and reporting as they apply to engineering work functions to an extent indicated by the following aspects:

T1 Communicating with personnel encompassing:

- Oral communications
- Written procedures and work instructions

T2 Communicating with suppliers

T3 Communicating with customers

T4 Purpose and extent of maintaining work activities records in an enterprise encompassing:

- 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 encompassing:
- Starting up
- Selecting application
- Entering information
- Saving
- Printing

T5 Techniques of analysis encompassing:

- 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

T6 Summary of statistics encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T7 Correlation and regression encompassing:

- 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.

T8 Investigation and reporting encompassing:

- 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.
- evaluation and interpretation of the results of the investigation.
- discussion of the investigation with reference to real world applications.
- chronology of the investigation.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

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Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

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Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Compile and produce an energy sector report as described in 8) and including:

A	Typical organisation policies and procedures.
B	Access to a report brief to established report parameters.
C	Access to appropriate person(s) to establish report requirements.
D	Establishing the scope and parameters of the report.
E	Determining the impact of other related works.
F	Developing design brief incorporating scenarios and all requirements.

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G	Appropriate computer application.
H	Identifying competencies required for the report.
I	Documenting report proposal.
J	Negotiating alterations to the proposed report successfully.

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.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to compiling and producing an energy sector report.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3

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'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit of competency describes work conducted by technical personnel who contribute to the conduct of energy sector report writing.

This unit of competency is typically performed by high-level 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.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter being reported upon. This unit of competency should be demonstrated in accordance with the organisations

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards

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RANGE STATEMENT

- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources
- Technical standards
- Regulatory requirements

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers determining correct operation of complex multiple path circuits and providing engineering solutions as they apply to various branches of electrotechnology work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

Application of the Unit

Application of the Unit **4**)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit 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

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1.2) License to practice

contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE126A	Provide solutions to basic engineering computational problems

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to solve problems in complex multiple path circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem 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 that may be required for the work are identified and accessed in accordance with established 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 complex multiple path circuits	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used to solve circuit problems from measure and calculated values as they apply to complex multiple path circuit.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem	3.1 OHS work completion risk control measures and procedures are followed.

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ELEMENT	PERFORMANCE CRITERIA
solving activities.	
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to solve circuit problems is documented.
	3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and provide engineering solutions for solving problems in complex multiple path circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE125A Circuit analysis

Evidence shall show an understanding of circuit analysis to an extent indicated by the following aspects:

T1 Voltage/Current Sources and Kirchhoff's Law for d.c. Linear Circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources
- calculating current and voltage in any d.c. network of up to two loops and three sources.
- Kirchhoff's Law using a circuit simulation program.
- function and operation of an electronics circuit simulation program.
- using electronics circuit simulation program.

T2 Superposition Principles for d.c. Linear Circuits encompassing:

- d.c. networks (two loops, three sources)
- using simulation programs
- calculating current and voltage in any d.c. network of up to two loops and three sources.
- Superposition theorem using a circuit simulation program.

T3 Mesh and Nodal Analysis for d.c. Linear Circuits encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- writing mesh equations for d.c. networks containing up to three loops.
- writing Nodal equations for d.c. networks containing up to three nodes.
- using mesh analysis to find currents in d.c. networks of up to two loops.
- using nodal analysis to find node voltage and branch currents in d.c. networks of up to two nodes
- using a circuit simulation program to confirm the results of Mesh analysis or Nodal analysis of d.c. networks.

T4 Thévenin's principles for d.c. Linear Circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Thévenin equivalent voltage and resistance for d.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Thévenin equivalent circuits by measurement.

T5 Norton's principles for d.c. linear circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Norton equivalent current and resistance for d.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Norton equivalent circuits by measurement.

T6 Phasors encompassing:

- time domain and frequency domain
- frequency, angular frequency and units of measurement
- defining rms and convert between time domain and rms phasor values for a sine wave.
- converting between angular frequency and frequency.
- using a calculator to convert between polar and rectangular forms of phasor.
- representing a.c. voltages on a phasor diagram.

T7 Complex Impedance encompassing:

- defining impedance, resistance and reactance.
- defining admittance, conductance and susceptance.
- converting between conductance to resistance.
- converting between susceptance and reactance.
- converting between impedance and admittance.
- sketching impedance and admittance diagrams.
- calculating two-component series equivalent circuits and two-component parallel equivalent circuits and convert between these forms.

T8 Series and parallel a.c. linear circuits encompassing:

- Kirchhoff's Laws

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REQUIRED SKILLS AND KNOWLEDGE

- series equivalent impedance
- parallel equivalent impedance
- voltage divider and current divider rules
- calculating and measuring voltage and currents in a series a.c .circuit and draw the phasor diagram.
- calculating and measuring currents in a parallel a.c. circuit and draw the phasor diagram.
- calculating and measuring voltage and currents in a series/parallel a.c. circuit and draw the phasor diagram.

T9 Superposition principles and Kirchoff's Laws applied to a.c. linear circuits encompassing:

- calculating current and voltage in any a.c. network of up to two loops and two sources.
- using circuit simulation programs to demonstrate the superposition theorem.
- function and operation of an electronics circuit simulation program.
- entering given circuit specifications into an electronic circuit program.
- setting the circuit simulation program operation parameters including input and output values, ranges and graduation.
- producing hardcopies of the circuit and analyse results.

T10 Mesh and Nodal analysis for a.c. linear circuits encompassing:

- Mesh analysis
- Node voltages and nodal analysis
- matrix representation
- method of determinants
- writing mesh equations for a.c. networks containing up to three loops.
- writing nodal equations for a.c. networks containing up to three nodes.
- using mesh analysis to find currents in a.c. networks of up to two loops.
- using nodal analysis to find node voltage and branch currents in a.c. networks of up to two nodes.
- using a circuit simulation program to confirm the results of mesh analysis or nodal analysis of a.c. networks.

T11 Thévenin and Norton theorems applied to a.c. linear circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.
- calculating the Thévenin equivalent voltage and impedance for a.c. networks and determining the load current, voltage and power.
- calculating the Norton equivalent current and impedance for a.c. networks and determining the load current, voltage and power.
- converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa.
- verifying the equivalence of Thévenin and Norton equivalent circuits by measurement.

T12 Star-delta conversions encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- Star connections
- Star-delta transformation formula equations
- selection of appropriate conversion
- calculating the delta connected equivalent of a star connected balanced a.c. or d.c. load and vice versa.
- converting a complex non-series/parallel network to a series/parallel network by means of star-delta or delta-star conversions.
- verifying star-delta and delta-star network conversions by measurements.

T13 Complex a.c. power and maximum power transfer theorem encompassing:

- true power, reactive power and apparent power
- maximum power transfer
- calculating real, reactive and apparent power for series/parallel a.c. circuits and state the appropriate units of measurement.
- calculating the power factor of a.c. series/parallel circuits.
- drawing power triangle for a given circuit.
- calculating the load value which would consume maximum power and calculate this power for d.c. networks.
- calculating the load value which would consume maximum power in an a.c. network when the load is a pure resistance and calculate the power.
- calculating the load value which would consume maximum power in an a.c. network when the load is an impedance of variable resistance and reactance and calculate the power.
- verifying load selection by measurement.

T14 Transients encompassing:

- transients in R-C and R-L circuits
- growth and decay
- calculating voltage and currents in R-C series circuits using exponential equations.
- calculating voltage and currents in R-L series circuits using exponential equations

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this

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Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate

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evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in complex multiple path circuits as described in 8) and including:

    A Determining the operating parameters of existing circuit.

    B Using established problem solving methods.

    C Taking relevant measurements accurately.

    D Interpreting measured values appropriately.

    E Providing effective solutions to circuit problems from measurements and calculations.

    F Giving written justification of solutions provided.

    G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to

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undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in complex multiple path circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

- Complex series-parallel circuits as they apply to problems related to engineering diagnosis and development work functions in any of the

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RANGE STATEMENT

following disciplines:

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

- In relation to the following types of circuit problems and on at least two occasions:
  - 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

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

Custom Content Section

Competency Field 5)

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Competency Field **5)**

Electrotechnology

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UEENEEE126A Provide solutions to basic engineering computational problems

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the application of computational processes to solve engineering problems. It encompasses working safely, applying problem solving techniques, using a range of mathematical processes, providing solutions to electrical/electronics engineering problems and justifying such solutions.

Note.
Typical engineering problems are those encountered in meeting requirements in a design brief, meeting performance requirements and compliance standards, revising systems operating parameters and dealing with system malfunctions

Application of the Unit

Application of the Unit **4**)

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a license to practice in

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1.2) License to practice

the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE029B Solve electrotechnical problems

or

UEENEEG102A Solve problems in low voltage a.c. circuits

or

UEENEEH014B Troubleshoot frequency dependent circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Provide computational solutions to engineering problems.	1.1 OHS procedures for a given work area are obtained and understood
	1.2 The nature of the problems are obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.3 Problems are clearly stated in writing and/or diagrammatic form to ensure they are understood and appropriate methods used to resolve them.
	1.4 Known constants and variable related to the problem are obtained from measured values or problem documentation.
	1.5 Alternative methods for resolving the problem are considered and where necessary discussed with appropriate person(s).
	1.6 Problems are solved using appropriate mathematical processes and within the realistic accuracy.
2 Complete work and document problem solving activities	2.1 Justification for solutions used to solve engineering problems is documented for inclusion in work/project development records in accordance with professional standards.
	2.2 Work completion is documented and appropriate person(s) notified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing computational solutions to basic engineering problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE126A Electrotechnology engineering maths

Evidence shall show an understanding of electrotechnology engineering maths to an extent indicated by the following aspects:

T1 Rational, irrational numbers and basic algebra

- simplification of expressions involving square roots and cube roots
- scientific and engineering notation
- evaluation of expressions using a calculator
- convert units of physical quantities using unity brackets
- substitute given values into formulae to find physical quantities
- manipulate algebraic expressions using mathematical operations in their correct order, the laws of indices, expansion of brackets and collecting like terms

T2 Algebraic manipulation

- Factorise algebraic expressions using common factors
- Factorise quadratic expressions using trial and error on the factors of the coefficients
- Simplify algebraic fractions using common denominators and cancelling
- Solve simple one variable equations including algebraic fractions
- Find the quotient and remainder given a linear divisor.
- Transpose formulae to find a required variable.

T3 Laws of indices

- Conversion between decimal notation, scientific notation and engineering notation
- Laws of indices: positive /negative values, multiplication/division, fractional values, index equals zero
- Logarithmic laws: multiply/divide
- solution of exponential equations using logarithms, substitution and solution of relevant formulae involving exponents or logarithms
- Graphs of exponential functions, 10x and ex and the inverses log10(x) and loge(x) functions on log-linear graphs
- Convert numbers into scientific and engineering notation using the laws of indices
- Manipulate and simplify arithmetic and algebraic expressions using the laws of indices and logarithms
- Express logarithms as indices.
- Perform logarithmic operations.
- Determine logarithms and antilogarithms to base 10, using a scientific calculator.

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REQUIRED SKILLS AND KNOWLEDGE

- Determine logarithms and antilogarithms to base e, using a scientific calculator.
- Convert logarithmic values from base 10 to base e and vice versa.
- Sketch given functions on log-linear graphs

T4 Estimations, errors and approximations

- Errors in measurement
- Maximum probable error
- Show awareness of errors in measurement and of giving results in appropriate number of significant figures
- Use estimations and approximations to check the reasonableness of results.

T5 Plane figures – triangles and basic trigonometry

- Angles in a triangle
- Isosceles and equilateral triangles
- Congruent triangles
- Similar triangles
- Pythagoras' theorem
- Area of triangles
- Basic trigonometry functions
- Degrees, radians
- The ratios: sin, cos, tan, cosec, sec, cot.
- Inverse trig functions
- Sine and cosine rules

T6 Plane figures - quadrilaterals and circles

- Types and properties of quadrilaterals
- Areas and perimeters of regular quadrilaterals
- Lengths of arcs
- Angles in a circle - degrees
- Angles in a circle - radians
- Lengths of chord segments
- Tangents to circles
- Circumference and area of circles
- Names and characteristics of common polygons

T7 Graphs of Trigonometric functions

- Graph trigonometric functions and solve trigonometric equations.
- Simplify trigonometric expressions using trigonometric identities
- Convert angular measure in degrees to radians and vice versa
- Graph trigonometric functions including graphs of $y = \sin x$ and $y = \cos x$
- Using vocational applications of current or voltage as a function of time, consider changes in amplitude, consider changes in frequency.
- Examine relationships of frequency, period and angular velocity.

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REQUIRED SKILLS AND KNOWLEDGE

- Sketch graphs of the form f(t) = a sin φt and f(t) = a cos φt, where a is the peak voltage or current, and φ is the angular velocity
- Solve graphically equations of the form f(t) = a sin φt and f(t) = a cos φt
- Show a positive or negative angle on the unit circle.
- Use symmetry properties to find trigonometric ratios for angles greater than π/2.
- Solve simple vocational problems relating period, frequency and angular velocity.

T8 Graphs of linear functions

- The number plane
- Gradient and x and y intercepts of a straight line
- Equation of a straight line length and mid-point of a straight line segment
- Function notation

T9 Simultaneous equations

- Graphical solutions
- Substitution
- Elimination
- Solve 2 linear simultaneous equations both algebraically and graphically.

T10 Matrices

- Perform the basic operations on matrices up to 3 x 3
- Manipulate matrix equations and expressions
- Recognise inverse and identity matrices up to 3 x 3 and use to solve systems of linear equations.
- Find determinants up to 3 x 3 and use to solve systems of linear equations.
- Solve problems involving more than two simultaneous equations.
- State the limitations of graphical methods of solution.
- Distinguish between a matrix and an array.
- Describe the null, diagonal and unit matrix
- Describe and identify a singular/non-singular matrix

T11 Quadratic functions

- Graphs of quadratic functions represented by parabolas and the significance of the leading coefficient.
- Graph quadratic functions and solve quadratic equations.
- Sketch and interpret the graphs of quadratic functions showing the significance of the leading coefficient and the zeros
- Solve quadratic equations by factoring or using quadratic formula
- Solve simultaneously linear and quadratic equations algebraically and geometrically
- Interpret verbally formulated problems involving quadratic and linear equations and solve.

T12 Exponential and logarithmic functions

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REQUIRED SKILLS AND KNOWLEDGE

- Transform non-linear functions (including exponential) to linear forms and plot data.
- Draw curves of best fit, interpolate data and estimate constants in suggested relationships.
- Interpret verbally formulated problems involving growth and decay, and solve.
- Graph exponential and logarithmic functions and solve exponential and logarithmic equations.
- Sketch the graphs of simple exponential and logarithmic functions showing behaviour for large and small values

T13 Vectors and Phasors

- The vector as an expression of magnitude and direction
- The vector sum of x and y values in terms of magnitude and direction
- Rectangular components of vectors in the form $x = r \cos \theta$ and $y = r \sin \theta$
- Rectangular-polar and polar-rectangular conversion
- Vector addition and subtraction
- Express rectangular components of vectors in the form $x = r \cos \theta$ and $y = r \sin \theta$

T14 Complex numbers

- Definitions and notation of complex numbers
- Complex numbers as vectors on an Argand diagram
- laws of complex numbers and apply the laws in suitable calculations.
- Plot complex numbers on the Argand plane.
- Express vectors as complex numbers and perform suitable calculations.
- Calculate the conjugate of a complex number.
- Using a calculator for rectangular-polar and polar-rectangular conversions.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that

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EVIDENCE GUIDE

can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
    - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

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- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Provide computational solutions to basic engineering problems as described in 8) and including:

    A Clearly stating problems in written and diagrammatic form.

    B Obtaining known constants and variable from an appropriate source.

    C Solving problems using appropriate mathematical processes.

    D Documenting justification of solutions provided in accordance with professional standards.

    E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the

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	approved industry simulation policy. The resources used for assessment should reflect current industry practices in relation to providing computational solutions to basic engineering problems.
Method of assessment	**9.4**) This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to problems that apply to engineering diagnosis development and work functions with the following attributes:

- working safety
- problem solving techniques application
- range of mathematical processes used
- provision electrical/electronics engineering problems solutions
- such solutions justification

Providing computational solutions to basic engineering problems shall be demonstrated in any of the following disciplines:

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RANGE STATEMENT

- Computers
- Data Communications
- Electrical
- Electronics
- Instrumentation
- Refrigeration and Air Conditioning

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrotechnology

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UEENEEE131A Solve problems in ELV circuits for non electrical workers

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers basic electrical fundamentals to support non electrical workers in jobs that incorporate some exposure to extra low voltage electricity. It encompasses working safely, recognising basic electrical components and the use of basic voltage, current and resistance measuring devices.

Application of the Unit

Application of the Unit **2)**

2.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

2.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Licensing/Regulatory Information

License to practice **3)**

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable

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License to practice **3)**

contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 2 Writing 2 Numeracy 2

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of

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Employability Skills	**5)** competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to work on simple extra-low voltage electrical circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work preparation measures and procedures are followed.
		1.3	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
		1.4	Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.
		1.5	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2	Perform basic maintenance and inspection of simple extra low voltage electrical circuits.	2.1	OHS risk control work measures and procedures are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.

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ELEMENT		PERFORMANCE CRITERIA	
		2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Basic maintenance and inspection procedures are followed.
3	Complete work and report maintenance and inspection activities.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Work completion is documented and appropriate person(s) notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage single path circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE131A ELV Electrical Fundamentals

Evidence shall show an understanding of electrical fundamentals for non electrical workers to an extent indicated by the following aspects:

T1 Basic electrical concepts encompassing:

- electrical current
- production of electricity by simple renewable and non renewable energy sources
- utilisation of electricity by various loads

T2 Basic electrical circuit encompassing:

- 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
- voltage and current levels in a simple circuit

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REQUIRED SKILLS AND KNOWLEDGE

- relationship between voltage drops and resistance
- setting up and connecting a simple circuitmeasurement of resistance, voltage and current values in a simple circuiteffects of an open-circuit, a closed-circuit and a short-circuit

T3 Electrical power encompassing:

- concepts of power and energy
- effects of power rating of components

T4 Effects of electrical current encompassing:

- physiological effects of current and the fundamental principles (listed in AS/NZS 3000) for protection against the this effect
- typical uses of the effects of current
- fundamental principles (listed in AS/NZS3000) for protection against the damaging effects of current

T5 Electrical energy sources encompassing:

- principles of producing an electric current from motor generator sets
- principles of producing an electrical current from photo-voltaic arrays
- principles of producing an electrical current from primary, and secondary cells

T6 Resistance encompassing:

- power loss (heat) occurring in a conductor.
- effect of losses in electrical wiring and machines
- measurement of resistance

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment,

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such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also

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comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Performing basic maintenance on simple extra-low voltage circuits as described in 8) and including:

A Following basic maintenance procedures

B Reporting information arising from basic maintenance and inspection.

C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials

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to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to in extra-low voltage single path circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

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RANGE STATEMENT

- This unit shall be demonstrated in relation to simple circuits as they apply to maintenance work functions in any of the following disciplines:
  - Renewable and sustainable energy systems, and
  - Remote area essential service operations
- In relation to the following on at least two occasions:
  - Identifying the components of an existing circuit
  - making and reporting measurements of circuit parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers identifying occupational health and safety hazard and risks and documenting control measures. It encompasses 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.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this competency standard unit contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this competency standard unit is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

This unit addresses information, processes and techniques for the application of occupational health and safety specific to working with electrotechnology and is essential for employees without managerial or supervisory responsibilities

Elements and Performance Criteria Pre-Content

6) Elements describe
the essential outcomes

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of a unit of competency

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Identify and document hazards and risks.	1.1	Hazards are identified the appropriate persons involved and in accordance with compliance procedures. Note: Typically this will relate to such things as: The type of job, Electrical conditions, Energy levels, Radiation levels, Toxic substances, Airborne particles, Pressure discharge, Explosive atmosphere, Work-site location, General work-site conditions, Specific work location, Moving parts, Tools and equipment, Workers competence and/or capacity and/or personal effects
		1.2	Risks associated with identified hazards are determined in consultation with others and documented in accordance with compliance procedures.
		1.3	Provision is made to accommodate changes to documentation should unforseen hazards be identified.
2	Assign levels of risk and develop and document control measures.	2.1	Level of risk is assigned for each identified hazard in accordance with the regulations and following compliance procedures.
		2.2	Control measures are developed for hazard, level of risk and activity to eliminate and/or mitigate the risk following compliance procedures.
		2.3	Hazard, level of risk and control measures are agreed to and documented in consultation with all involved in accordance with compliance procedures.
3	Monitor and review the control measures.	3.1	Documented control measures are made available for reference by all involved with the work.
		3.2	Control measures are modified where required in consultation with all involved with the work in accordance with compliance procedures.
		3.3	Documentation of hazards, risk control measures and their application are filed in accordance with

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ELEMENT **PERFORMANCE CRITERIA**

compliance procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and documenting occupational hazards and risks in electrical.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EE137A **Risks and control measures for dealing with workplace hazards**

Evidence shall show an understanding of risks and control measures for dealing with workplace hazards to an extent indicated by the following aspects:

T1 Risk management and assessment of risk encompassing:

- Principle and purpose of risk management, and
- Processes for conducting a risk assessment
- Hazard identification by job analysis and work-site inspections
- Recording hazards and assessing the risk.

T2 Hazards and risks and control measures in working on construction sites encompassing:

- Hazards include manual and mechanical handling; working at heights; working in confined spaces; noise; dusts, gases, chemicals.

T3 Hazards associated with extra-low voltage, low-voltage and high-currents encompassing:

- Arrangement of power distribution and circuits in electrical installations
- Parts of an electrical system and equipment that operate at low-voltage and extra-low voltage,
- Parts of an electrical system and equipment where high-currents are likely.

T4 Hazards and risks and control measures associated with high-voltage encompassing:

- Parts of an electrical system and equipment that operate at high-voltage,
- The terms ‘touch voltage’, ‘step voltage’, ‘induced voltage’ and ‘creepage’ as they relate to the hazards of high-voltage
- Control measures used for dealing with the hazards of high-voltage.

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REQUIRED SKILLS AND KNOWLEDGE

T5 Hazards and risks and control measures in working with low voltage equipment encompassing:

- Risks in modifying electrical installations, fault finding, maintenance and repair.
- Control measures before, while and after working on electrical installations, circuits or equipment.
- Isolation and tagging-off procedures.
- Risks and restrictions in working live.
- Control measures for working live.

T6 Hazards and risks and control measures associated with harmful, devices, materials, gases, dusts and airborne contaminant encompassing:

- Harmful devices: gas touches, welding equipment, laser equipped devises and the like.
- Harmful materials: gases (refrigerants) and some industrial cleaning agents, fibres of optical cable, thermal insulation
- Harmful airborne contaminants: fibres of thermal insulation, fibres of optical cable, fibrous cement materials, asbestos and other fibres in insulation materials.

T7 Determine the degree of the risk encompassing:

- The three recognised levels of risk are:
  - High (potential to kill or permanent disability);
  - Medium (potential to cause an injury or illness of a permanent nature);
  - Low (potential to cause a cause minor injury requiring first aid but no permanent disability)

T8 Use control measures to eliminate or control the risk encompassing:

- Hierarchy of control measures are:
  - eliminate the risk by discontinuing the activity.
  - control the risk by redesigning the equipment
  - adopt administrative procedures
  - use of personal protective equipment.
- Control measures are formally documented in Job Safety Analysis (JSAs) or Safe Work Methods (SWMs).

T9 Engaging in monitoring and reviewing processes to ensure control measures remain valid.

Evidence Guide

EVIDENCE GUIDE

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EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.**1**)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate

9.**2**)

Before the critical aspects of evidence are considered all prerequisites must be met.

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EVIDENCE GUIDE

competency in this unit

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Document and applying measure to control occupational health and safety risks in electrotechnology work as described in 8) and including:

    A Identifying with appropriate person and in accordance with compliance procedures.

    B Determining the risk associated with identified hazards

    C Assigning the risks and developing and documenting control measures.

    D Reviewing and modifying control measures where required.

    E Recording activities.

    F Dealing with unplanned events

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EVIDENCE GUIDE

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to documenting occupational hazards and risks in electrical.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with other related units making up a qualification or possible skill clusters.

Components of this unit are also included in the critical aspects of evidence of all units to help ensure the appropriate level of responsibility for safety has been acquired.

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Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to electrotechnology work functions, including but limited to: installation, testing, inspection, fault finding, maintenance or development work functions covering:

- Relevant occupational health and safety 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 organistaion.

In any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electrical Machines
- Electronics
- Fire protection
- Instrumentation and Control
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology
- Energy Supply, Transmission and Distribution Networks

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

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Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Custom Content Section

Competency Field **5**)

Electrotechnology

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UEENEEE151A Transport apparatus, equipment and materials

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers transport apparatus, plant accessories and materials. It encompasses safe working practices and following work processes that satisfy electrical principles for transporting apparatus and materials.

Application of the Unit

Application of the Unit **2)**

This unit shall apply to persons entering work in energy sector and may be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, and power operated tools, vehicles, road signage and traffic control,

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License to practice **3)**

lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit.

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Plan and prepare for the transport of apparatus and materials.	1.1 Transport of apparatus and materials is planned and prepared to ensure OHS policies and procedures are followed, the work is appropriately sequenced in accordance with requirements.
	1.2 Appropriate personnel are consulted to ensure apparatus; accessories, plant, equipment and/or materials are appropriately identified, and checked against manufacturer transport instructions and requirements.
	1.3 Transport details of apparatus and materials are checked against job requirements.
	1.4 Plant needed to carry out the work is obtained in accordance with established procedures and checked for correct operation and safety.
	1.5 Where appropriate, team and individual work roles and responsibilities within the team are identified.
	1.6 Preparatory work is checked to ensure no damage has occurred and complies with requirements.
2 Transport apparatus and materials.	2.1 OHS policies and procedures for the transport of apparatus plant and materials are followed.
	2.2 Apparatus, plant and materials are transported in accordance with requirements, and manufacturer transport instructions without damage or distortion to the surrounding environment or services.

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ELEMENT	PERFORMANCE CRITERIA	
	2.3	Unplanned events or conditions are responded to in accordance with established procedure.
	2.4	Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are implemented.
	2.5	Ongoing checks of the work quality are undertaken in accordance with established procedures.
3 Check and notify completion of work.	3.1	Final inspections are undertaken to ensure the transported apparatus and materials conforms to requirements.
	3.2	Work completion is notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and transporting energy sector apparatus and materials.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE151A Energy sector apparatus and materials transport

Evidence shall show an understanding of energy sector apparatus and materials transport to an extent indicted by the following aspects:

T1 Energy sector apparatus encompassing:

- Types of apparatus used in the electrotechnology, ESI and gas industry

T2 Energy sector materials encompassing:

- Types of materials used in the electrotechnology, ESI and gas industry
- OH&S requirement

T3 Energy sector transport encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- Types of transport used in the electrotechnology, ESI and gas industry
- Manual handling techniques

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered

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will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Transport apparatus and materials as described in 8) and

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including:

A Transporting apparatus.

B Transporting equipment.

C Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

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.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to transporting apparatus and materials.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3

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'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to transporting apparatus and equipment in any 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

Generic terms used throughout this Vocational Standard shall be regarded as part of

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RANGE STATEMENT

the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEE190A Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the preparation of, and modification of, preliminary engineering drawings for electrotechnology/ utilities applications using manual drafting methods and computer-aided design (CAD) equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEED104A	Use software for engineering applications
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to produce electrotechnology/utilities engineering drawings	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed
		1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
		1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
		1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2	Produce electrotechnology/utilities engineering drawings	2.1	OHS risk control measures and procedures for carrying out the work are followed
		2.2	The types of design drawings and layouts required are determined from project specifications
		2.3	Technical data of system components is interpreted to determine parameters that are to be included in the drawings
		2.4	Appropriate software tools are used to produce drawing based on standard protocols
		2.5	Drawings are checked for accuracy are compliance with project specifications
		2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work

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ELEMENT	PERFORMANCE CRITERIA	
		outcomes.
3 Complete and report electrotechnology/utilities engineering drawings	3.1	Completed drawings are submitted to an appropriate person to be checking for accuracy and compliance with project specifications.
	3.2	Any alterations, additions or correction instructions are followed and drawings are re-submitted for final approval
	3.3	Copies of completed drawings are filed securely in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and methods used to prepare electrotechnology/utilities engineering drawings using manual drafting and CAD applications.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE190A Electrotech/utilities engineering drawings and diagrams

Evidence shall show an understanding of electrotech/utilities engineering drawings and diagrams to an extent indicated by the following aspects

T1 Drawing fundamentals encompassing:

- 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
- drawing forms; sheet size and format, metric, imperial, 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, software warning plates)
- delineation; line conventions and lettering, multi- and sectional view drawings,

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REQUIRED SKILLS AND KNOWLEDGE

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

T2 Lettering encompassing:

- 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

T3 Sketching encompassing:

- 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

T4 Geometric construction encompassing:

- 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

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REQUIRED SKILLS AND KNOWLEDGE

- intermediate CAD commands
- plotting and printing equipment set up and configuration

T5 Multi-view orthographic projections Australian/New Zealand and industry standards encompassing:

- 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)

T6 Auxiliary views encompassing:

- principles, terms and conventions usage in auxiliary views
- use and application of auxiliary views
- primary auxiliary view construction
- secondary auxiliary view construction

T7 Descriptive geometry/revolutions encompassing:

- 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

T8 Sectional views/conventions encompassing:

- principles, terms, symbols and conventions of sectional views
- use and application of sectional views
- drawing standard sectional views

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REQUIRED SKILLS AND KNOWLEDGE

- use of conventional breaks
- symbols used to represent different materials
- use of cutting plans

T9 Pictorial drawings introduction and production to Australian/New Zealand and industry standards encompassing:

- 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

T10 Dimensioning/size description and tolerancing as applied to drafting encompassing:

- 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

T11 Development layouts of various shaped objects to Australian/New Zealand and industry standards encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- principals and concepts of development layouts of various shaped objects
- terms, conventions and codes related to surface developments
- surface developments 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 stretchouts

T12 Layout drawings production to Australian/New Zealand and industry standards encompassing:

- 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

T13 Technical illustrations drawing to Australian/New Zealand and industry standards encompassing:

- 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

T14 Graphs and charts production to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of basic graphs, charts and diagrams production
- terms, conventions and codes related to basic graphs, charts and diagrams production

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T15 Thread representations encompassing:

- principles, concepts and applications of threaded fasteners
- terms, conventions and codes related to threaded fasteners
- types and usage techniques of threaded fasteners
- drawing of threads using simplified and schematic types of thread representation

T16 Working drawings encompassing:

- 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

T17 Care and use of equipment encompassing:

- 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
- Computer Aided Design (CAD) station components identification
- CAD setup requirements to complete a basic drafting problem

T18 Computer-aided drawing design (CAD) - basics encompassing:

- principles, terms, symbols and conventions usage in computer-aided drawing design (CAD)
- concepts and applications of CAD and related application commands
- types of CAD hardware
- CAD standards encompassing: file presentation; layering standards - sorting graphic data including data groups, principal data, supporting data, layering naming convention, colour assignment standard (layer colours and pen weights), provision for creation of new layers; blocks standards - real blocks object,

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REQUIRED SKILLS AND KNOWLEDGE

common block objects, symbol objects, block library, block naming; text style standards - text styles naming, text height; dimension styles standards - dimension style naming; linetype standards; title blocks and graphic scales - title block set-up, information title blocks, drawing scales; systems of measurement and preferred scales - drawing scales

- 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, etc.
- components and symbol libraries creation, editing and retrieval
- plotting drawings to the proper scale
- scaling techniques applications
- layering techniques applications
- Line-Type (LT) scale usage
- drawing techniques application
- drawing setups to applicable standards (e.g. settings, layers, line types, and widths)
- 2-D 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 the 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

T19 Basic production fabrication drawings to Australian/New Zealand and industry standards encompassing:

- principles, terms, symbols, codes and conventions usage in production fabrication drawings

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REQUIRED SKILLS AND KNOWLEDGE

- types and usage techniques of detailed and assembly drawings
- detailing: encompassing 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: encompassing 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/CAM applications
- gears drawings
- cams 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 applications
- manufacturing processes (e.g. machine, metal forming, and CNC)

T20 Pattern development encompassing:

- 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

T21 Maps and profiles design and production to Australian/New Zealand and industry standards encompassing:

- 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

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T22 Pipe/plumbing drawings basics encompassing:

- 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

T23 Structural steel, welding and sheet metal drawings basics encompassing:

- principles, terms and conventions usage in structural steel, welding and sheet metal drawings
- applicable codes (e.g. OHS, Standards Australia/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
- types and usage techniques of structural and welding drawings
- techniques and applications in creating structural drawings using measuring, labeling, 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

T24 Ink overlay drawings produced to Australian/New Zealand and industry standards encompassing:

- principals, concepts and applications of ink overlay drawings production
- terms, conventions and codes related to ink production
- drawing specifications identification and analysis

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REQUIRED SKILLS AND KNOWLEDGE

- rapid graph equipment usage procedures

T25 Drawings reproductions to Australian/New Zealand and industry standards encompassing:

- 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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

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The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling

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employment

- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Prepare electrotechnology/ utilities engineering drawings using manual drafting and CAD applications as described in 8) Range and including:

A	Carrying out freehand sketching of simple electrotechnology/ utilities products, and components using pictorial methods to generate two and three dimensional electrotechnology/ utilities images encompassing a range of standard components, such as devices, components, parts, equipment and structures, sketched together with other solid and hollow items.
B	Preparing and modifying preliminary electrotechnology/ utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices
C	Preparing and modifying preliminary electrotechnology/ utilities drawings and diagrams using computer-aided design equipment and software
D	Notating type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities drawings, briefs and/or specifications.
E	Obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations.
F	Drawing single part components, simple electrotechnology/ utilities assemblies for fabrication, assembly or installation of products encompassing dimensions, fabrication and/or installation notes, and parts lists from predetermined dimensions, associated tolerances and design specifications
G	Using CAD equipment and related commands and drawing environments to produce setting out details; drawing template for a range of paper sizes, the drawing title and scale used, date of drawing and other relevant information; and/or working drawings
H	Stating the purpose and usage of a variety of atypical electrotechnology/ utilities drawings for electrotechnology and electricity supply industry applications

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I	Generating a variety of CAD drawings from 2D components to 3D models by applying relevant techniques and processes, extracting properties, applying basic rendering techniques and incorporating pre-prepared symbols to construct electrotechnology/ utilities diagrams and assembly drawings to produce section, surface modelling, solid modelling, and wireframe modelling views
J	Applying safety precautions when working with CAD equipment

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to preparing electrotechnology/ utilities engineering drawings using manual drafting and CAD applications

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires

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that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the preparing electrotechnology/ utilities engineering drawings using manual drafting and CAD applications

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the preparation of electrotechnology/utilities engineering drawings using manual drafting and CAD applications:

- Covers mechanical, fabrication, fluid power
- Drawings include 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
- Engineering drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards for electrotechnology/ utilities applications
- Manual drafting methods, techniques, procedures and devices
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology / utilities related engineering drawings, briefs and/or specifications
- Sketching methods, techniques, procedures and devices encompassing freehand sketching
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations

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RANGE STATEMENT

- Geometric construction
- Multi-view orthographic projections
- Auxiliary views
- Descriptive geometry/revolutions
- Sectional views/conventions
- Pictorial drawings
- Dimensioning/size description and tolerancing
- Development layouts
- Layout drawings
- Technical illustrations
- Graphs and charts
- Thread representations
- Working drawings
- Technical drawing equipment including computer-aided drawing design (CAD) applications, peripherals and devices
- Care and use of equipment
- Safety precautions when working with CAD equipment
- Fabrication drawings
- Pattern development
- Maps and profiles design
- Pipe/plumbing drawings
- Structural steel and sheet metal drawings
- Ink overlay drawings production
- Drawings reproductions
- 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 with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEE191A Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the preparation of, and modification of, preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices and computer-aided design equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEED104A	Use software for engineering applications
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE104A	Solve problems in d.c. circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE190A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

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Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed
		1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
		1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
		1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and	2.1	OHS risk control measures and procedures for carrying out the work are followed
		2.2	The types of design detailed drawings and layouts required are determined from project specifications

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ELEMENT		PERFORMANCE CRITERIA	
	software.	2.3	Technical data of system components is interpreted to determine parameters that are to be included in the detailed drawings
		2.4	Appropriate software tools are used to produce detailed drawings based on standard protocols
		2.5	Detailed drawings are checked for accuracy are compliance with project specifications
		2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3	Complete electrotechnology/utilities drawings using manual drafting and CAD equipment and software	3.1	Completed drawings are submitted to an appropriate person to be checked for accuracy and compliance with project specifications.
		3.2	Any alterations, additions or correction instructions are followed and drawings are re-submitted for final approval
		3.3	Copies of completed drawings are filed securely in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and the preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EE191A Electrotechnology/ utilities drawings and diagrams

Evidence shall show an understanding of electrotech/utilities drawings and diagrams to an extent indicated by the following aspects

T1 Electrotechnology/ utilities drafting fundamentals encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T2 Standard drawing sheets and drawing sheet layout encompassing

- 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

T3 Electrotechnology/ utilities drawings line work, symbols, lettering and techniques production to Australian/New Zealand and industry standards encompassing:

- 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

T4 Sketching techniques for electrotechnolgy/ utilities applications encompassing:

- lines and letters
- shapes
- solids
- axonometric views
- building sketch
- isometric views
- object sketch
- perspective; building interior perspective sketch
- detail labelled sketch

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REQUIRED SKILLS AND KNOWLEDGE

T5 Pole and structure elevations encompassing:

- elevation sheet layout
- elevation labeling
- 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

T6 Survey base plan drawings encompassing:

- survey base plan scale
- survey base plan
- survey base plancontents
- modelspace and paperspace
- external reference (xref) drawings
- viewports

T7 Auxiliary Views and Revolutions encompassing:

- 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

T8 Map Drafting encompassing:

- 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

T9 Civil/GIS (Geographic Information Systems) drawings basics encompassing:

- principles, terms and conventions usage in civil GIS drawings
- land surveying techniques (e.g. property line, corners, symbols, coordinates, base line, and typical sections)

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T10 Architectural and site plan drawings for electrotechnology/ utilities applications encompassing:

- principles, purpose, terms and conventions usage in basic architectural drawings
- typical scales
- 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

T11 AutoCAD basics for electrotechnology/ utilities applications encompassing:

- 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; I/O devices identification; computer components installation and configuration arrangements and application
- CAD filing and naming conventions
- opening program/closing and saving drawings
- basic drafting commands encompassing: line; circle; spline; rectangle
- basic modification commands encompassing: erasing; copy; mirror; block; trim; extend
- layout and plotting
- design centre encompassing: electrical symbols; electronic symbols
- AutoCAD and lists

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REQUIRED SKILLS AND KNOWLEDGE

- 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
- 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, AC and DC; 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, circuit breakers; push button - disconnect switches, momentary contact, maintained contact; meters; resistors; transformers - power, current, potential, auto-transformers

T12 Drawing numbering, file names and digital file storage encompassing:

- drawing series and version control
- drawing sheet numbering
- drawing file names
- drawing storage
- drawing file

Evidence Guide

EVIDENCE GUIDE

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EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software as described in 8) Range and including:

A Carrying out freehand sketching of simple electrotechnology/ utilities products, circuits and components using pictorial methods to generate two and three dimensional electrotechnology/ utilities images encompassing a range of standard components, such as devices, components, parts, equipment and structures,

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	sketched together with other solid and hollow items.
B	Preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using manual drafting methods, techniques, procedures and devices
C	Preparing and modifying preliminary electrotechnology/utilities drawings and diagrams using computer-aided design equipment and software
D	Notating type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology/ utilities drawings, briefs and/or specifications.
E	Obtaining specifications from design information, customer requirements, sketches, preliminary layouts and/or field investigations.
F	Drawing single part components, simple electrotechnology/ utilities assemblies and circuits for fabrication, assembly or installation of products encompassing dimensions, fabrication and/or installation notes, wiring schedules and parts lists from predetermined dimensions, associated tolerances and design specifications
G	Using CAD equipment and related commands and drawing environments to produce setting out details; drawing template for a range of paper sizes, the drawing title and scale used, date of drawing and other relevant information; and/or working drawings
H	Stating the purpose and usage of a variety of typical electrotechnology/utilities drawings for electrotechnology/ utilities industry applications
I	Generating a variety of CAD drawings from 2D components to 3D models by applying relevant techniques and processes, extracting properties, applying basic rendering techniques and incorporating pre-prepared symbols to construct electrotechnology /utilities diagrams and assembly drawings to produce section, surface modelling, solid modelling, and wireframe modelling views
J	Applying safety precautions when working with CAD equipment

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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with **9.5)**

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other units

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the development of electrotechnology/utilities drawings is required.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the preparation of electrotechnology/utilities drawings using manual drafting and CAD equipment and software:

- Drawings include layouts, assembly and installation drawings, and modifications (version control), and conversion between drawing types
- Electrotechnology drafting specifications, layouts, sketches or verbal instructions in conformance with Australian Standards and enterprise standards
- Manual drafting methods, techniques, procedures and devices
- Type, form and size of materials from information, abbreviations and symbols supplied on electrotechnology drawings, briefs and/or specifications
- Sketching methods, techniques, procedures and devices encompassing freehand sketching
- Specifications may be obtained from design information, customer requirements, sketches, preliminary layouts and/or field investigations
- Electrotechnology drawings line work, symbols, lettering and techniques
- Sketching techniques
- Technical drawing equipment including computer-aided drawing design (CAD) applications, peripherals and devices including AutoCAD basics for electrotechnology applications and related commands
- Safety precautions when working with CAD equipment
- Pole and structure elevations
- Survey base plan drawings
- Auxiliary Views and Revolutions
- Map Drafting
- Civil/GIS (Geographic Information Systems) drawings basics
- Architectural and site plan drawings
- Organisational procedures for preparation and production of drawings, drawing sets, specifications, drafting documentation and operating and maintenance

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RANGE STATEMENT

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 with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEE192A Produce detailed electrotechnology /utilities drawings using computer aided design equipment and software

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers the production of, and modification and maintenance of, detailed electrotechnology/utilities drawings and diagrams using computer-aided design (CAD) equipment and software from specifications, layouts, sketches or verbal instructions in conformance with Australian Standards, enterprise standards and/or design brief.

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEED104A	Use software for engineering applications
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEE104A	Solve problems in d.c. circuits
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEE190A	Prepare engineering drawings using manual drafting and CAD for electrotechnology/utilities applications
UEENEEE191A	Prepare electrotechnology/utilities drawings using manual drafting and CAD equipment and software

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 4 Writing 4 Numeracy 4

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Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to produce detailed electrotechnology /utilities drawings	1.1	OHS procedures for a given work area are identified, obtained and understood
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed
		1.3	The extent of the work is determined from project specifications and discussion with appropriate personnel
		1.4	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site
		1.5	Software tools and equipment a needed for the work are obtained in accordance with established procedures
2	Produce detailed electrotechnology	2.1	OHS risk control measures and procedures for carrying out the work are followed

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ELEMENT	PERFORMANCE CRITERIA	
/utilities drawings.	2.2	The types of design detailed drawings and layouts required are determined from project specifications
	2.3	Technical data of system components is interpreted to determine parameters that are to be included in the detailed drawings
	2.4	Appropriate software tools are used to produce detailed drawings based on standard protocols
	2.5	Detailed drawings are checked for accuracy are compliance with project specifications
	2.6	Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.
3 Complete detailed electrotechnology /utilities drawings.	3.1	Completed detailed drawings are submitted to an appropriate person to be checked for accuracy and compliance with project specifications.
	3.2	Any alterations, additions or correction instructions are followed and detailed drawings are re-submitted for final approval
	3.3	Copies of completed detailed drawings are filed securely in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and using drawings, diagrams, schedules and manuals.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

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REQUIRED SKILLS AND KNOWLEDGE

KS01-EE192A Detailed electrotechnology /utilities drawings

Evidence shall show an understanding of detailed electrotechnology /utilities drawings to an extent indicated by the following aspects

T1 Detailed working drawings encompassing:

- definition of detailed working drawings
- usage and types of detailed working drawings
- composition and layout of detailed working drawings
- preparation of detailed working drawings

T2 Advanced (master) sketching techniques encompassing:

- lines and letters
- shapes
- 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

T3 Drafting/modelling electrotechnology/ utilities encompassing:

- standard documentation practices for block diagrams
- wiring diagrams
- circuit schematics
- control circuits
- creating one-line diagrams
- standard PCB layouts
- printing wiring assemblies
- art masters

T4 Electrotechnology/ utilities related drawings encompassing:

- charts and graphs; encompassing alternating current, frequency, electromagnetisms, signals, 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

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REQUIRED SKILLS AND KNOWLEDGE

- busways
- electric services installations
- protection devices -over current and voltage, circuit breakers, and fuses
- switches, contactors and relays
- control systems and devices
- 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, LED, LCD, discharge devices, thermionic valves, vacuum tubes; assemblies, modules; prototyping aids; mechanical accessories
- data networks, communication and telecommunications equipment and devices
- pneumatic and hydraulic circuits, including related piping ware and components

T5 AutoCAD – functional for electrotechnology/ utilities encompassing:

- user coordinates systems
- Right-Hand Rule
- 2D geometry extrusion
- 2D views from 3D models and visa-versa
- user coordinate systems creation
- 3D wireframe geometry creation
- 3D faces on wireframe geometry placement
- 3D geometry viewing
- surfaces construction
- working drawings generation
- drawing set up using model space and paper space; encompassing printing and plotting
- plotting
- rendering
- 3D models construction
- 3D surface models construction
- 3D models display from different vantage points
- orthographic drawings constructed from 3D 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

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REQUIRED SKILLS AND KNOWLEDGE

- basic user-level system customisation
- design environment
- basic workflow

T6 AutoCAD – project basics encompassing:

- project manager
- project drawing list
- projects progression/stages
- projects copy and activation

T7 AutoCAD – schematic wiring, editing, components and reporting encompassing:

- wiring and ladders
- wire types, wire numbers
- source and destination signal arrows
- multiple phase and multi wire circuits
- circuits
- connectors and point-2-point wiring
- basic editing utilities
- miscellaneous tools
- data tools
- re-sequence and retag drawings
- using the auditing tools
- schematic symbol annotation
- inserting schematic symbols
- swapping and updating blocks
- inserting schematic components from lists
- generating schematic reports

T8 AutoCAD – panel layouts encompassing:

- creating panel layouts from schematic lists
- din rail utility usage
- panel footprints
- terminal strip editor usage
- panel layout annotation and reports

T9 AutoCAD – PLC modules encompassing:

- PLC I/O modules
- PLC modules builder
- PLC database file editor; encompassing insert and edit in parametric PLC modules, nonparametric PLC modules, and stand-alone PLC I/O points
- PLC I/O address-based tagging
- spreadsheet to PLC I/O utility

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REQUIRED SKILLS AND KNOWLEDGE

T10 AutoCAD - detailed settings and configurations – advanced commands encompassing:

- drawing properties
- project properties
- creating wire types
- reference files usage
- creating drawing templates
- installation and search paths

T11 AutoCAD – detailed customised components and customised detailed data encompassing:

- schematic symbols
- icon menu system
- panel footprints
- part catalogue databases usage
- pin list database editor
- title block update and attributes
- terminal properties editor
- reference files usage

T12 AutoCAD – advanced auditing tools, automation tools and integration encompassing:

- auditing tools
- trouble shooting tools
- updating schematics from spreadsheets
- generating automatic reports
- AutoCAD integration
- din rail editor
- footprint with wire annotation
- conduit tools
- cables management

T13 AutoCAD – database management and productivity tools encompassing:

- 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

T14 Drawings production using CAD application programs encompassing:

- principals, concepts and applications of drawings production using CAD

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REQUIRED SKILLS AND KNOWLEDGE

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 encompassing:

- 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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit. It must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work

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environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace

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procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Producing detailed electrotechnology /utilities drawings using computer aided design equipment and software as described in 8) Range and including:

A	Producing, modifying and maintaining detailed electrotechnology/ utilities drawings and diagrams using computer-aided design (CAD) equipment and software
B	Producing master sketches of complex electrotechnology/ utilities drawings using pictorial methods and scaling to generate relevant dimensional electrotechnology/ utilities images
C	Identifying, selecting and determining uses for a range of materials and equipment used in electrotechnology/ utilities engineering drafting applications
D	Drawing single and multi-part components and detailed electrotechnology/ utilities assemblies
E	Using advanced CAD equipment commands and drawing techniques and processes to produce detailed electrotechnology/utilities drawings
F	Using filing systems for managing, entering and/or retrieving technical information from computer related database programs
G	Applying safety precautions when working with CAD equipment

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Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed in this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to using drawings, diagrams, schedules and manuals.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

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For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with units covering the production of detailed drawings using computer aided design equipment and software for other disciplines.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to producing detailed electrotechnology /utilities drawings using computer aided design equipment and software covering:

- Drawings include detailed circuit and wiring diagrams/schedules, block diagrams, schematics, printed circuit board 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 encompassing 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 symbols supplied on detailed electrotechnology/ utilities engineering drawings, briefs and/or specifications
- Advanced computer-aided design (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

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RANGE STATEMENT

- Detailed working drawings
- Drafting/modelling electrotechnology/ utilities
- Detailed electrotechnology/ utilities drawings including a representative array of relevant 2D and 3D CAD drawings
- Single and multi-part components and detailed electrotechnology/ utilities assemblies for fabrication, assembly, installation and/or modification of products encompassing dimensions encompassing 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 with the client, key stakeholders and other staff in the selection of the preferred option

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electrotechnology

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UEENEEF106A Solve problems in voice and data communications circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers providing known solutions to predictable problems in single and multiple path circuits operated at extra-low voltage as they apply to various voice and data communications work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable communication circuit problems.

Application of the Unit

Application of the Unit **2)**

This unit shall apply to persons entering work in electrotechnology and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to work on extra-low voltage voice and data communications circuits	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem 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 that may be required for the work are established in accordance with established 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 extra-low voltage voice and data communications circuits	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established routines are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits.
	2.5 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy

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ELEMENT	PERFORMANCE CRITERIA	
		practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established routine procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage voice and data communications circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EF106A Electrotechnology communication principles

Evidence shall show an understanding of electrotechnology communication principles, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. The basic electrical circuit

- basic circuit components
- function of basic circuit components
- connection of components
- measurement of circuit parameters
- open-circuit, closed-circuit and short-circuits.

T2. Circuit parameter relationships

- Ohms Law
- calculation of voltage, current and resistance
- power dissipated
- calculation of power.

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REQUIRED SKILLS AND KNOWLEDGE

T3. Measurement instruments (voltage, current & resistance)

- safe working procedures
- handling and storing instruments
- selecting and set up of instruments
- connecting instruments
- read analogue scales and digital readouts.

T4. Effects of electrical current

- physiological effect
- heating effect
- magnetic effect
- chemical effect
- typical uses

T5. EMF sources

- basic generator
- basic thermocouple
- photovoltaic cells
- piezo electric
- primary and secondary cells.

T6. D.C. resistive circuits

- series circuits (set-up, measurement and calculations)
- parallel circuits (set-up, measurement and calculations)
- series-parallel circuits (set-up, measurement and calculations).

T7. Capacitance

- construction of capacitors
- operation of capacitors
- units
- charge of a capacitor
- RC series circuit.

T8. Magnetism and electromagnetic induction

- permanent magnets
- electromagnetism
- induced emf
- inductors
- principles of inductance
- unit of inductance
- electromagnetic radiation (EMR)
- cross talk.

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REQUIRED SKILLS AND KNOWLEDGE

T9. A.C. principles

- generation of sinusoidal voltage
- a.c. circuit parameters – frequency, period, amplitude, instantaneous value, maximum value, peak value, peak to peak value and rms value
- calculation of frequency and rms values
- effects of frequency on inductors
- effects of frequency on capacitors
- transformers construction and operating principles.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being

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assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.

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- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in solving problems in extra-low voltage data and voice communications circuits as described in 8) and including:

A Determining the operating parameters of an existing circuit.

B Determining the frequency response of existing circuits

C Altering an existing circuit to comply with specified operating parameters.

D Developing circuits to comply with a specified function and operating parameters.

E Identifying earth faults.

F Identifying loss of supply.

G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

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Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solve problems in extra-low voltage voice and data communications circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

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RANGE STATEMENT

This unit shall be demonstrated in relation to:

Single source single and multiple path communication circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Voice and Data Communications
- Electronics
- Fire protection
- Renewable and sustainable energy systems, and
- Security technology
- In relation to at least three of the following types of communication circuit problems and on at least two occasions:
- Determining the operating parameters of an existing circuits
- Determining the frequency response of an existing circuits
- Identifying and locating open-circuits
- Identifying and locating short-circuits
- Identifying earth faults
- Identifying loss of supply

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Data and Voice Communications

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UEENEEF107A Set up and configure the wireless capabilities of communications and data storage devices

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers entering instructions in wireless devices with simple built-in programming function and verifying that the device operates as intended. It encompasses safe working practices, checking device software installation, following written and oral instruction and procedures and completing necessary documentation.

Note: Examples of wireless devices are personal digital assistants(PDAs), mobile phones, personal computers(PCs) remote controls etc

Application of the Unit

Application of the Unit **2)**

This unit is intended for competency development entry-level employment based programs incorporated in approved contracts of training. It may be used to augment previously acquired competencies.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit may require a registration to practise in the workplace subject to requirements set out ACMA 'Open' Cabling Provider Rule. Practice in workplace and during training is also

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License to practice **3)**

subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, 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.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

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Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to enter operating instructions.	1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are reported and advise on risk control measures are sought from the work supervisor.
	1.4 Work supervisor or customers are consulted to determine which functions of the device are to be use 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.

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ELEMENT	PERFORMANCE CRITERIA	
	1.6	Device installation is checked for compliance with job specification and regulations where they apply.
2 Enter operating instructions.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.3	The required status of each function of the device is entered and their parameters set in accordance with manufactures programming instructions.
	2.4	Entered data are checked as meeting those specified by the work supervisor or customer.
	2.5	Procedures for referring non-routine events to immediate supervisor for directions are followed.
3 Test device operation and report.	3.1	Device operation is tested in strict accordance OHS requirements and procedures.
	3.2	Operating anomalies are identified and corrected in accordance with established routines.
	3.3	OHS work completion risk control measures and procedures are followed.
	3.4	Work site is cleaned and made safe in accordance with established procedures.
	3.5	Work completion is reported and appropriate person(s) notified in accordance with established routines.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this

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REQUIRED SKILLS AND KNOWLEDGE

unit.

Evidence shall show that knowledge has been acquired of safe working practices and set up and configuring the wireless capabilities of communications and data storage devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies..

KS01-EF107A Wireless devices

Evidence shall show an understanding of wireless devices, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Types and applications

T2. Operating principles at sub-system level

T3. Programming functions

T4. Networking set up

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that,

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in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range

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statement

- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Set up the wireless capabilities of communications and data storage devices as described in 8) and including:

A	Understanding required operating functions and parameters.
B	Identifying non-compliance conditions of device installation.
C	Entering functions and parameters correctly.
D	Correcting programming anomalies.
E	Testing and verify device operation.
F	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

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.

Context of and specific resources for assessment

9.3)

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This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to setting up the wireless capabilities of communications and data storage devices.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

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Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to entering and verifying operating instruction in at least two types of microprocessor equipped devices with built-in icon-based programmable functions such as programmable relays, timers, temperature controllers, detection devices for security and fire.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Data and Voice Communications

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UEENEEG006A Solve problems in single and three phase low voltage machines

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase machines and solving machine problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, machine connections circuit arrangements, issues related to machine operation, characteristics and protection and solutions to machine problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology 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. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

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will assist in identifying Employability Skill requirements.

Application of the Unit **4**)

4.1) **General Application**

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) **Importation**

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to solve single and three phase low voltage machines problems.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4	The nature of the machine (s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
	1.6	Sources of materials that may be required for the work are established in accordance with established

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ELEMENT	PERFORMANCE CRITERIA	
		procedures.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve single and three phase low voltage machine problems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.
	2.4	Established methods are used to solve machine problems from measure and calculated values as they apply to single and three-phase low voltage machines.
	2.5	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
	2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.7	Problems are solved without damage to machines, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve machine problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in single and three phase low voltage machines.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG006A Single and three-phase transformers

Evidence shall show an understanding of single and three phase transformers to an extent indicated by the following aspects:

T1 Transformer construction encompassing:

- types of lamination style and core construction used in single-phase, three phase, double wound, auto transformers and instrument transformers.
- identification of different winding styles/types used in transformers.
- methods used to insulate low and high voltage transformers.
- construction of transformer tanks for distribution transformers.
- transformer auxiliary equipment. (Bushings, surge-diverters, tap-changers, hot oil & winding indicators, breather, Buchholz relay and conservator).
- function of transformer auxiliary equipment.
- types of information stated on transformer nameplates.
- application of transformers.
- performing basic insulation resistance, continuity and winding identification tests.

T2 Transformer operation encompassing:

- 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.
- selecting transformers for specific application/s.
- safety features specified in AS/NZS3000 with respect to transformers and isolating transformers.

T3 Transformer losses, efficiency and cooling encompassing:

- power losses which occur in a transformer.

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REQUIRED SKILLS AND KNOWLEDGE

- tests which allow the power losses of a transformer to be determine.
- determination of transformer losses and efficiency using test results.
- relationship between transformer cooling and rating.
- methods used for natural and forced cooling of transformers.
- properties of transformer oil.
- tests conducted on transformer oil.

T4 Transformer voltage regulation and percent impedance encompassing:

- voltage regulation as applicable to a transformer.
- reasons for voltage variation in the output of a transformer.
- determine the voltage regulation of a transformer from voltage and percentage impedance values.
- percentage impedance as applied to transformers.
- determine the percent impedance by using test results.
- determine percent impedance of a transformer by calculation.

T5 Parallel operation of transformers and transformer auxiliary equipment encompassing:

- determine polarity markings for an unidentified single phase double wound transformer.
- need for parallel operation of transformers.
- conditions/restrictions required before two transformers can be connected in parallel.
- connecting transformers in parallel to supply a single load (loading on transformers operating in parallel).
- the consequences/effect of an incorrect connection.

T6 Auto-transformers and instrument transformers encompassing:

- identification of auto-transformers, voltage transformers and current transformers from their winding diagrams.
- determining voltage and current in the windings of an auto-transformer by calculation.
- advantages and disadvantages of an auto-transformer.
- AS/NZS3000 requirements with respect to transformers.
- construction of voltage transformers.
- ratings of voltage transformers.
- construction of current transformers.
- ratings of current transformers.
- precautionary measures taken to connect and disconnect instrument transformers.
- connection diagrams for instrument transformers.
- applications for auto-transformers and instrument transformers.

KS02-EG006A Alternating current rotating machines

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REQUIRED SKILLS AND KNOWLEDGE

Evidence shall show an understanding of alternating current rotating machines to an extent indicated by the following aspects:

T1 Operating Principles of three phase induction motors encompassing:

- determining circuit operating characteristics by using the right hand (grip) rule for conductors and solenoids and Fleming's left and right hand rules.
- characteristics of the magnetic field produced by a single, two and three-phase windings.
- 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.
- reversing the direction of rotation of a three phase induction motor

T2 Three phase induction motor construction encompassing:

- basic component parts of a three-phase induction motor.
- types of rotors used in three-phase induction motors.
- connecting three-phase induction motor in both star and delta.
- dismantling three-phase induction 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

T3 Three phase induction motor characteristics encompassing:

- 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 name plate information and by measurement.
- induction motors efficiency and minimum energy performance standards (MEPS).
- full load efficiency and power factor of induction motors.

T4 Single phase motors – split phase encompassing:

- common types of single phase motor.
- 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.
- connecting, running and reversing a split phase induction motor.

T5 Single phase motors – capacitor and shaded pole types encompassing:

- 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.

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REQUIRED SKILLS AND KNOWLEDGE

- operating characteristics and typical applications of each motor type listed above.
- connection and running each type of motor listed.
- reversing the direction of rotation of each of the capacitor type motors.

T6 Single phase motors – universal encompassing:

- 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.
- connecting, running and reversing a series universal motor.

T7 Motor protection encompassing:

- reasons why motor protection is required.
- requirements of the AS/NZS3000 Wiring rules with regards to motor protection.
- types of motor overload protection.
- operating principles of microtherm devices, thermal and magnetic motor protection devices.
- electrical features of motor protection HRC fuses.
- effects of under voltage and over voltage 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.

T8 Three phase synchronous machines- operation principles and construction encompassing:

- power transfer diagram of an a.c. synchronous machine.
- need for the generation of a sinusoidal waveform.
- principles of operation of a synchronous alternator.
- principles of 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.

T9 Alternators and generators encompassing:

- effects on the generated voltage of variations in excitation.
- effects on generated voltage of variations in load.
- 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.

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REQUIRED SKILLS AND KNOWLEDGE

- 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.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and

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operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in single and three phase low voltage machines as described as described in 8) and including:

    A Determining the operating parameters of existing machines.

    B Altering an existing machine to comply with specified operating parameters.

    C Developing machines/circuits to comply with a

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specified function and operating parameters.

D Determining the cause of low efficiency in an existing machine.

E Determining conditions causing an existing circuit to be unsafe.

F Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in single and three phase low voltage machines.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE001B and other discipline specific occupational health

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and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any four of the following problems in single and three-phase low voltage machine and circuits.

- Determining the operating parameters of existing machines
- Altering an existing machine circuit to comply with specified operating parameters
- Developing machine circuits to comply with a specified function and operating parameters

Note:
Operating parameters include voltage, current, torque, efficiency, power, energy and power factor

- Determining the cause of low efficiency in an existing machine.
- Determining problems in existing machines to malfunction

Note:
Problems include bearing noise/faults, vibration, undervoltage, unbalanced windings

- Determining conditions causing an existing machine/circuit to be unsafe.

Note:
Examples of unsafe circuits includes electric shock hazard from indirect contract with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG033A Solve problems in single and three phase low voltage electrical apparatus and circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers ascertaining correct operation of single and three phase low voltage electrical apparatus and circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, apparatus circuit arrangements, issues related to operation, characteristics and protection and solutions to apparatus/circuit problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) **License to practice**

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology 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. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged

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will assist in identifying Employability Skill requirements.

Application of the Unit **4**)

4.1) **General Application**

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) **Importation**

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to solve single and three phase low voltage electrical apparatus/ circuit problems.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 The nature of the apparatus/circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.

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ELEMENT	PERFORMANCE CRITERIA	
	1.6	Sources of materials that may be required for the work are established in accordance with established procedures.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Solve single and three phase low voltage electrical apparatus/circuit problems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Apparatus/circuits/plant is checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Established methods are used to solve apparatus/circuit problems from measure and calculated values as they apply to single and three-phase low voltage apparatus/circuit.
	2.5	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
	2.6	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.7	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve apparatus/circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with

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ELEMENT **PERFORMANCE CRITERIA**

established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in single and three phase low voltage electrical apparatus and circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG033A **Electrical apparatus and circuits**

Evidence shall show an understanding of electrical apparatus and circuits to an extent indicated by the following aspects:

T1 Lighting circuits – looping at the light/switch encompassing:

- the “loop at the light” method of wiring lighting circuits.
- the “loop at the switch” method of wiring lighting circuits
- wiring diagrams for the lighting circuit of an installation that incorporates one-way, two-way and two-way and intermediate switching of light points using the loop at the light/switch methods of TPS wiring.
- TPS cabling requirement for the loop at the light/switch circuit.
- installation methods of accessories and wiring for a lighting circuit incorporating one-way, two-way and two-way and intermediate switching of lighting points using the loop at the light/switch method of TPS wiring.
- correct operation of the install circuits including testing for correct compliance with Australian Standards.

T2 Circuits for socket outlets encompassing:

- the purpose of socket outlets.
- requirements concerning the polarity of switched socket outlets.
- correct cable size to supply 10 A, 15 A and 20 A socket outlets (single and three phase), for given installation conditions.
- number of socket outlets connected to a 16 A and 20 A circuit breaker.
- installation methods of a single phase socket outlet circuits.
- correct operation of the installed circuits including testing (dead testing only) for correct compliance with Australian Standards.

T3 Final sub-circuits and segregation encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- purpose of mixed circuits.
- circuit loading for a mixed circuit.
- purpose of segregation of circuits and the AS/NZS3000 requirements.
- Installation methods a single phase mixed circuits.
- correct operation of the installed circuits including testing for correct compliance with Australian Standards.

T4 Electrical heating control devices encompassing:

- methods of manual heat control.
- methods of automatic heat control.
- types and application for common thermostats.
- operation of common thermostats.
- sensitivity and differential of thermostats.
- testing of a thermostat (including differential and correct operation)
- applications of simmerstats (infinite controls).
- operation of a simmerstat.
- electronic heat control (phase control and zero voltage switching).

T5 Fixed electrical heating appliances encompassing:

- Terms: heat energy, temperature, specific heat capacity, thermal conductivity and thermal stability.
- determining the heat energy in joules and kWh in a simple heating process.
- methods of heat transfer.
- Determining the heat energy input and output of a heating process.
- connections to a two phase stove.
- operation of reverse cycle air conditioning.

T6 Electrical water heater operation encompassing:

- types of water heaters (instantaneous and storage) and their methods of control.
- intrinsic safety (pressure relief and thermal cut-out).
- testing of over temperature cut-out point of a thermostat.
- switchboard requirements to supply a controlled load water heater.
- internal circuit of a twin element water heater, and supply connections.
- tariffs employed by local supply authorities.
- solar heating system and its integration into an installation.

T7 Alternative supplies encompassing:

- reasons for the installation of alternative supplies.
- types of alternative supply systems.
- characteristics and operation of UPSs.
- Australian Standards and local requirements for safety services supply systems.

T8 Installation of batteries encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- common types of primary cells and secondary batteries and typical applications.
- terminal voltage of common primary cells and secondary cells.
- correct storage, handling and disposal techniques for cells and batteries.
- charge/discharge cycle for a secondary cell.
- effect of internal resistance on a secondary cell.
- state of charge of a secondary cell.
- installation of batteries as per AS/NZS3011
- commissioning procedures for various secondary batteries.
- safe working procedures when working with secondary cells and batteries.

T9 Fire protection – residential fire and smoke alarms encompassing:

- 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

T10 Emergency and evacuation lighting and lighting control encompassing:

- 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

T11 Lighting concepts and incandescent lighting encompassing:

- basic concepts of lighting.
- terminology, principles and standards relevant to lighting (energy efficiency as per BCA new lamp types and permitted replacements and their efficacy)..
- basic types of luminaries.
- operation of an incandescent lamp.
- types of incandescent lamps.
- expected lamp life, colour rendering and efficacy for typical incandescent lamps.
- lighting layout in terms of visual comfort and relevant Australian standards

T12 Fluorescent low intensity discharge lighting encompassing:

- types of low intensity discharge lamps.
- expected lamp life, colour rendering and efficacy for typical types of low intensity discharge lamps.
- operation of low intensity discharge luminaires including their control equipment.
- Australian Standard and local requirements for low intensity discharge lighting.
- methods for satisfying Australian Standards and local supply authority requirements

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REQUIRED SKILLS AND KNOWLEDGE

regarding low intensity discharge lighting.

T13 High intensity discharge lighting encompassing:

- types of high intensity discharge lamps.
- expected lamp life, colour rendering and efficacy for typical types of high intensity discharge lamps.
- operation of high intensity discharge luminaires including their control equipment.
- Australian Standard and local requirements for high intensity discharge lighting.
- methods for satisfying Australian Standards and local supply authority requirements regarding high intensity discharge lighting.
- 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

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the

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EVIDENCE GUIDE

most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment

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- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in single and three phase low voltage electrical apparatus and circuits as described as described in 8) and including:

A Determining the operating parameters of existing apparatus/circuits.

B Altering an existing apparatus/circuit to comply with specified operating parameters.

C Developing apparatus/circuits to comply with a specified function and operating parameters.

D Determining the cause of low efficiency in an existing apparatus/circuit.

E Determining conditions causing an existing apparatus/circuit to be unsafe.

F Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in electromagnetic circuits.

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EVIDENCE GUIDE

Method of assessment	**9.4**) This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any four types of problems for both single and three-phase apparatus and circuits and three types of circuit/equipment as listed below.

Type of problems

- Determining the operating parameters of existing apparatus/circuit
- Altering an existing apparatus/circuit to comply with specified operating parameters
- Developing apparatus/circuits to comply with a specified function and operating parameters

Note:
Operating parameters include voltage, current, efficiency, power, energy and power factor

- Determining the cause of low efficiency in an existing apparatus/circuit.
- Determining conditions causing an existing apparatus/circuit to be unsafe.

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RANGE STATEMENT

	Note: Examples of unsafe circuits includes electric shock hazard from indirect contract with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection
Types of circuits/equipment	• Lighting circuits • Power circuits • Rotating machines • Electrical heating • Lighting

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG063A Arrange circuits, control and protection for general electrical installations

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit		Adjust Performance Criteria numbering that was previously missing	

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the arrangement and termination of circuits, control and protection devices and systems for electrical installations operating at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompass knowledge and application of schemes for protection of persons and property, correct functioning, ensuring compatibility with the supply, arranging installation into circuits and selecting and arranging switchgear/controlgear and protective devices to meet compliance requirements and documenting arrangement decisions.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

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1.2) License to practice

Practice in 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.

Note:
1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, 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.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnolgy 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. circuit

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Prerequisite Unit(s) **2)**

UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA

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ELEMENT	PERFORMANCE CRITERIA
1 Prepare to arrange electrical installations circuits, control and protection	1.1 The extent and nature of the electrical installation is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the electrical installation shall comply are identified, obtained and understood.
	1.3 Load requirements for individual current-using equipment is determined from job specifications or from consultation with appropriate persons.
2 Arrange electrical installations 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 technical standards and job specifications and requirements.
	2.2 Earthing is arranged and terminated to comply with the MEN system requirements.
	2.3 Protective devices are selected to meet the required switching and tripping currents, co-ordination and discrimination for overload and short-circuit protection.
	2.4 Residual current devices are selected to meet the required circuit, switching and tripping currents required.
	2.5 Switchgear/control gear is selected to meet current, voltage and 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 requirements.
3 Document electrical installation circuits, control and protection arrangements	3.1 Evidence is obtained from manufacturers/suppliers that electrical equipment selected complies with safety requirements.
	3.2 Reasons for selections made, including calculations, are documented in accordance with established procedures.

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ELEMENT	PERFORMANCE CRITERIA
	3.3 Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of arranging electrical installations circuits, control and protection.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG063A Electrical installations — arrangement, control and protection

Evidence shall show an understanding of circuit arrangements, control and protection of electrical installations that comply with the Wiring Rules and Service Rules to an extent indicated by the following aspects:

T1 Safety principles to which electrical systems in building and premises shall comply.

- Safety principles are given in Part1 (Section 1) of the Wiring Rules AS/NZS 3000 with deemed-to-comply requirements given in Sections 2 to 8.
- Compliant methods for providing protection - include those for providing protection against direct and indirect contact; thermal effects; unwanted voltages; overcurrent; fault currents; overload; overvoltage; injury from mechanical movement.
- Requirements for installation design and selection of equipment - includes compliant protection arrangements; correct functioning; compatibility with supply; estimation of maximum demands; voltage drop considerations; arrangement of circuits and the like

T2 Circuit and control arrangements encompassing:

- reason for dividing electrical installations into circuits
- factors that shall 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.

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REQUIRED SKILLS AND KNOWLEDGE

- number and types of circuits required for a particular installation.
- diagrams/schedules of circuits for given installations.
- application and arrangements of SELV and PELV circuits
- application and arrangement of an isolated supply

T3 Hazards and risks in an electrical installation encompassing:

- effects on the human body of various levels of a.c. and d.c. current and duration of current flow for various current paths.
- risk of ignition of flammable materials due 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 extra-low voltage

T4 Protection against indirect contact encompassing:

- indirect contact with live parts of an electrical installation may occur.
- methods and devices that comply with the Wiring Rules for providing protection against indirect contact.
- 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 Residual Current Devices (RCDs)
- protection against indirect contact by use of extra-low voltage and electrical separation.
- Protection requirements for damp situations.

T5 Earthing encompassing:

- the terms: earthed, earthed situation, earth electrode, equipotential bonding, multiple earthed neutral (MEN) system, protective earth-neutral (PEN) conductor, main earthing conductor, protective earthing (PE) conductor, functional earthing, MEN link.
- selection of minimum size-earthing conductor for a range of active conductor sizes and materials.
- parts of an earthing system and the purpose of each.
- typical arrangement for a MEN earthing system.
- arrangements of protective earthing conductors that comply with the Wiring Rules.
- requirements for equipotential bonding in a range of installation situations.
- Installation of a MEN earthing system for a single phase installation

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REQUIRED SKILLS AND KNOWLEDGE

T6 Protection against overload and short circuit current encompassing:

- overload current or fault currents in an electrical installation.
- equivalent circuit of an earth fault-loop
- level of fault current possible at a given point in an installation from the fault-loop impedance and data from the electricity distributor.
- methods and devices that comply with the Wiring Rules AS/NZS 3000 for providing protection against the damaging effects of overload and fault current
- requirements for co-ordination between protective devices and conductors
- requirements for co-ordination of protection devices for discrimination and back-up protection.

T7 Devices for automatic disconnection of supply encompassing:

- operating principles of thermal/magnet circuit breakers.
- operating principles of common types of fuses.
- operating principles of residual current devices (RCD).
- time/current curves tripping characteristics of various types of circuit breakers that comply with the requirements of the Wiring Rules.
- time/current curves fusing characteristics of various types of fuses that comply with the requirements of the Wiring Rules.
- time/current curves tripping characteristics of various types of RCDs that comply with the requirements of the Wiring Rules.
- factors in a fault loop that will affect the impedance of the circuit.
- maximum impedance of an earth fault-loop to ensure operating of a protection device.
- selecting a fuse for fault current limiting protection.
- drawing switchboard wiring arrangements of 2-pole RCDs, 4-pole RCDs, combination RCD/MCBs.

T8 Protection against over voltage and under voltage encompassing:

- causes of over voltage and how this may affect the electrical system.
- methods for protection against over voltage.
- causes of under voltage and how this may affect the electrical system.
- methods for protection against under voltage.

T9 Control of an electrical installation and circuits encompassing:

- switch types, current and voltage ratings and 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.

T10 Switchboards / distribution boards encompassing:

- Purpose, types and applications.

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REQUIRED SKILLS AND KNOWLEDGE

- Physical and circuit arrangements for whole current and CT metering.
- Physical and circuit arrangements of main switches, circuit protection devices, fault-current limiters and metering equipment and other distributor equipment.
- compliance requirements (includes location and access, arc fault protection, identification, construction suitability, equipment marking, wiring, fire protection and arc-fault protection).

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

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EVIDENCE GUIDE

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - arranging electrical installations circuits, control and protection as described as described in 8) and including:

    A Determining the extent and nature of the installation for

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EVIDENCE GUIDE

	job specifications B Obtaining and understand the safety and other regulatory requirements to which the electrical installation shall comply C Determining individual load requirements. D Arranging and terminate circuits, control and protective devices to comply with all requirements E Selecting circuit protective devices residual current device that comply with all requirements. F Selecting switchgear and control gear that meet current, voltage and IP ratings and functional requirements. G Obtaining evidence of compliance for the equipment selected H Documenting installation arrangement, specification for items selected and reasons for the selections made. I Dealing with unplanned events
Context of and specific resources for assessment	**9.3**) This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include: • OHS policy and work procedures and instructions. • Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit. These should be part of the formal learning/assessment environment. Note: Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy. The resources used for assessment should reflect current industry practices in relation to arranging circuits, control and protection for general electrical installations.
Method of	**9.4**)

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EVIDENCE GUIDE

assessment	This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit: UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to arranging of circuits, control and protection for at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a fire pump.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

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Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG076A Install and replace low voltage current transformer metering

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers the installation and/or replacement of low voltage CT metering for measurement of energy use by consumers under choice of supplier arrangement. It encompasses working safely and to installation and set up standards, evaluating the integrity of metering wiring and earthing systems, fixing metering, making power and communication connections, setting meter parameters and completing the necessary documentation.

Application of the Unit

Application of the Unit **4**)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 4 level or higher.

Licensing/Regulatory Information

1.2) **License to practice**

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work.

Practice in workplace and during training is also subject to regulations directly related

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1.2) License to practice

to occupational health and safety and where applicable, contracts of training such as apprenticeships.

Note.
Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG105A and all prerequisite units it specifies

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Note: Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the pre-requisite requirements of this unit.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology 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

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Prerequisite Unit(s) **2)**

UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG103A	Install low voltage wiring and accessories
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
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
UEENEEG105A	Verify compliance and functionality of low voltage general electrical installations

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability

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Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install or replace CT energy metering.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented. (Note 1: Examples of hazards likely to be encountered are asbestos reinforced switchboard panels, deteriorating switchgear and cabling and location of the switchboard.)
	1.4 Switchboard on which the meter(s)/CTs is/are to be installed is inspected and evaluated for compliance with safety and functionality standards. (Note 2: Safety and functionality standards include the clear identification of switchboard components and their function, sound electrical insulation of wiring and components, sound MEN and main earth connections, fire integrity and access.)
	1.5 Approval to rectify safety and/or functionality defects of the switchboard is sought from person of higher authority in accordance with established procedures.

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ELEMENT	PERFORMANCE CRITERIA	
	1.6	Installation of the meter and rectification work is prepared in consultation with others affected by the work and sequenced appropriately.
	1.7	Material needed for the work is obtained in accordance with established procedures and checked against job requirements.
	1.8	Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.
2 Install or replace CT metering.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Existing metering is checked as being isolated in strict accordance OHS requirements and procedures.
	2.4	Approved rectification work is carried out to comply with standards and in accordance with established procedures.
	2.5	Meters and CTs are installed/replaced to comply with technical standards and job specifications and requirements.
	2.6	Metering power and communication connections (where necessary) are made in accordance with manufacturer's specifications and functional and regulatory requirements.
	2.7	Meter operating parameters are set in accordance with manufacturer's specifications and functional and regulatory requirements.
	2.8	Unexpected situations are dealt with safely and with the approval of an authorised person
	2.9	Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.
	2.10	Metering/CT installation is carried out efficiently without unnecessary waste of materials or damage to apparatus,

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ELEMENT	PERFORMANCE CRITERIA	
		circuits, the surrounding environment or services and using sustainable energy principles.
3 Complete and report metering installation activities.	3.1	OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Final checks are made to that the installed metering and CTs conform to requirements.
	3.4	'As-installed' metering and CTs and rectification work is documented and appropriate persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing and setting up interval metering.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG076A Low voltage current transformer metering

Evidence shall show an understanding of low voltage current transformer metering to an extent indicated by the following aspects:

T1 Current Transformers (CTs) encompassing:

- uses and functions
- AS60044.1-2007 requirements
- characteristics and saturation
- differences between metering and protection CTs
- standard ratios and outputs
- accurate range of loading
- thermal current limit

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REQUIRED SKILLS AND KNOWLEDGE

- burden and connecting cable length
- short circuiting secondary as a safety issue
- accuracy class

T2 Revenue meter types used with CTs encompassing:

T3 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

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.**1**)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the

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critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install /replace low voltage CT metering as described in 8) and including:

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A Inspecting and evaluating safety and functionality compliance of the switchboard accurately.

B Following established procedures to obtain approval to rectify non-compliance aspects of the switchboard.

C Carrying out preparation work effectively.

D Rectifying compliance defects.

E Placing and securing metering correctly.

F Making power and communications connections in accordance with manufacture's specifications and functional and regulatory requirements.

G Setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements.

H Reinstating supply to the installation safely.

I Documenting CT metering and rectification work and notifying appropriate persons in accordance with established procedures.

J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry

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simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing and setting up interval metering.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the installation of at least a:

- low voltage CT installation using single phase meters
- low voltage CT installation using a polyphase meter
- metering installation where compliance rectification work is required

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG101A Solve problems in electromagnetic devices and related circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers determining correct operation of electromagnetic devices and related circuits and providing solutions as they apply to electrical installations and equipment. It encompasses working safely, power circuit problems solving processes, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in electromagnetic devices and related circuits.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) **License to practice**

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

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Elements and Performance Criteria Pre-Content

6) Elements describe
the essential outcomes
of a unit of competency

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to work on electromagnetic devices and circuits.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work preparation measures and procedures are followed.
		1.3	The nature of the device(s)/circuit(s) problem 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 that may be required for the work are established in accordance with established 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 electromagnetic devices/circuit problems.	2.1	OHS risk control work measures and procedures are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Established methods are used to solving circuit problems from measure and calculated values as they apply to electromagnetic devices/circuits.

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ELEMENT	PERFORMANCE CRITERIA	
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in electromagnetic devices and related circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG101A Electromagnetic devices and circuits

Evidence shall show an understanding of electromagnetic devices and circuits to an extent indicated by the following aspects:

T1 Magnetism encompassing:

- magnetic field pattern of bar and horse-shoe magnets.
- magnets attraction and repulsion when brought in contact with each other.
- common magnetic and non-magnetic materials and groupings (diamagnetic, paramagnetic and ferromagnetic materials).
- principle of magnetic screening (shielding) and its applications.
- practical applications of magnets

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REQUIRED SKILLS AND KNOWLEDGE

- construction, operation and applications of reed switches.

T2 Electromagnetism encompassing:

- conventions representing direction of current flow in a conductor.
- magnetic field pattern around a single conductor and two adjacent conductors carrying current.
- Using the “right hand rule” to determine the direction of magnetic field around a current carrying conductor.
- direction of force between adjacent current carrying conductors.
- effect of current, length and distance apart on the force between conductors (including forces on bus bars during fault conditions).
- magnetic field around an electromagnet.
- Using the “right hand rule” to determine the direction of magnetic field around a current carrying coil.
- magnetomotive force (m.m.f.) and its relationship to the number of turns in a coil and the current flowing in the coil.
- practical applications of electromagnets.

T3 Magnetic circuits encompassing:

- magnetic characteristic curve for various materials and identify the various regions.
- Identify the various conditions of a magnetic material from its Hysteresis loop.
- factors which determine losses in magnetic material.
- methods used to reduce electrical losses in a magnetic circuit.
- magnetic flux (definition, unit and symbol).
- reluctance as the opposition to the establishment of magnetic flux.
- permeability (definition, symbol and unit).
- difference for magnetic and non-magnetic materials in regards to reluctance and permeability.
- calculation of m.m.f., flux or reluctance given any two values.
- flux density (definition, symbol, unit and calculation).
- magnetising force (definition, symbol, unit and calculation).
- common magnetic circuit types.
- effect of an air gap in a magnetic circuit.
- terms “magnetic leakage” and “magnetic fringing”.

T4 Electromagnetic induction encompassing:

- principle of electromagnetic induction (Faraday’s law of electromagnetic induction).
- applying “Fleming’s right hand rule” to a current a carrying conductor under the influence of a magnetic field.
- calculation of induced e.m.f. in a conductor given the conductor length, flux density and velocity of the conductor.
- calculation of induced e.m.f. in a coil given the number of turns in a coil and the rate of change of flux.

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REQUIRED SKILLS AND KNOWLEDGE

- calculation of force on a conductor given the flux density of the magnetic field, length of the conductor and the current being carried by the conductor.
- Lenz's law
- applications of electromagnetic induction

T5 Inductance encompassing:

- construction of an inductor, including a bifilar winding inductor.
- Australian Standard circuit diagram symbol for the four types of inductor.
- effect of physical parameters on the inductance of an inductor.
- common types of inductor cores.
- applications of the different types of inductors.
- definition of terms self induction, inductance and mutual inductance.
- calculation of value of self induced e.m.f. in a coil.
- mutual induction occurs between two coils.
- graphical relationship between load voltage, current and self induced e.m.f. in a single d.c. circuit having inductance.
- practical applications for the effects of self and mutual induction.
- undesirable effects of self and mutual induction.
- definition of term "time constant" and draw the characteristic curve as applied to a series circuit containing an inductor and a resistor. (LR circuit)Calculation of value of the time constant for an LR circuit given the values of the components.
- time constants required for the current in an LR circuit to reach its final value.
- determining of instantaneous values of voltage and current in an LR circuit using a universal time constant chart.

T6 Measurement Instruments encompassing:

- moving coil, moving iron, dynamometer meter movements and clamp testers.
- practical applications for moving coil, moving iron and dynamometer meter movements.
- Calculation of resistance of shunts and multipliers to extend the range of ammeters and voltmeters.
- factors to be considered in selecting meters for a particular application.
- safety category of meters and their associated applications.
- steps and procedures for the safe use, care and storage of electrical instruments.

T7 Magnetic devices encompassing:

- construction, operation and applications of relays.
- construction, operation and applications of contactors.
- magnetic methods used to extinguish the arc between opening contacts.
- construction, operation and applications of Hall Effect devices.
- operation and applications of magnetostriction equipment.
- construction, operation and application of magnetic sensing devices.

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REQUIRED SKILLS AND KNOWLEDGE

T8 Machine principles encompassing:

- basic operating principle of a generator.
- applying Fleming's right hand rule for generators.
- basic operating principle of a motor.
- applying Fleming's left hand rule for motors.
- calculation of force and torque developed by a motor.

T9 Rotating machine construction, testing and maintenance encompassing:

- components of a d.c. machine.
- difference between a generator and a motor in terms of energy conversion.
- nameplate of a machine.
- using electrical equipment to make electrical measurements and comparison of readings with nameplate ratings.
- Identification of faults in a machine from electrical measurements.
- care and maintenance processes for rotating machines
- safety risks associated with using rotating machinery.

T10 Generators encompassing:

- basic operation of a d.c generator.
- calculation of generated and terminal voltage of a d.c. shunt generator
- prime movers, energy sources and energy flow used to generate electricity.
- types of d.c. generators and their applications.
- methods of excitation used for d.c generators.
- equivalent circuit for a d.c. generator.
- importance of residual magnetism for a self excited generator.
- open circuit characteristics of d.c. generators.
- load characteristics of a d.c generator.
- reversing the polarity of a d.c. generator
- Connect and test a d.c generator on no-load and load
- Identify safety risks associated with using generators.

T11 Motors encompassing:

- operation of a motor and its energy flow.
- effect of back e.m.f. in d.c. motors
- torque as the product of the force on the conductors and the radius of the armature/rotor.
- types of d.c. motors and their applications.
- circuit diagrams for the types of d.c. motors.
- equivalent circuit for the types of d.c. motors.
- calculation of power output of a motor.
- characteristics of the different types of d.c. motors.
- connection and testing a d.c. shunt motor on no-load and load

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REQUIRED SKILLS AND KNOWLEDGE

- reversing the direction of rotation of a d.c. motor.
- safety risks associated with using motors (include risks of series d.c. motors).

T12 Machine efficiency encompassing:

- losses that occur in a d.c machine.
- methods used to determine the losses in a d.c. machine.
- calculation of losses and efficiency of a d.c machine.
- efficiency characteristic of a d.c. machine and the conditions for maximum efficiency.
- application of Minimum Energy Performance standards (MEPS).
- methods used to maintain high efficiency.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

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EVIDENCE GUIDE

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

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EVIDENCE GUIDE

- Solve problems in electromagnetic circuits as described as described in 8) and including:

A Using methodological techniques to solve problems in circuits with an electromagnetic device from measure and calculated values

B Determining the operating parameters of an existing circuit with an electromagnetic device.

C Alternating an existing circuit with an electromagnetic device to comply with specified operating parameters.

D Developing circuits with electromagnetic devices to comply with a specified function and operating parameters.

E Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving problems in electromagnetic devices and related circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires

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EVIDENCE GUIDE

	assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9**.**5**) For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving problems in electromagnetic devices and related circuits by:

- Determining the operating parameters of an existing circuits with electromagnetic devices
- Altering an existing circuit with an electromagnetic device to comply with specified operating parameters
- Developing circuit with an electromagnetic device to comply with a specified function and operating parameters

AND

In relation to the following on more than one occasions:

Solving problems

- Connecting circuits,
- Using methodological problem solving techniques,
- Solving electromagnetic device problems,
- Demonstrate an understanding of the behaviour of current and voltage in circuits with electromagnetic devices
- Calculating circuit parameters accurately,

Circuit and device testing

- Choose correct instruments and ranges for testing,
- Connect meters to measure parameters in circuits with

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RANGE STATEMENT

electromagnetic devices,

and

At least four of the following electromagnetic devices

- Reed switches
- Solenoids
- Relays
- Contactors
- Inductive limit switches
- Bells
- Lifting magnets
- Core balance devices
- Magnetic overloads
- Motors
- Generators
- Magnetic brakes
- Magnetic circuit breakers

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

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2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG102A Solve problems in low voltage a.c. circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers ascertaining correct operation of single and three phase a.c. circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It encompasses safe working practices, multiphase circuit arrangements, issues related to protection, power factor and MEN systems and solutions to circuit problems derived from calculated and measured parameters.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE104A	Solve problems in d.c circuits
UEENEEG101A	Solve problems in electromagnetic devices and related circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

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Elements and Performance Criteria Pre-Content

6) Elements describe
the essential outcomes
of a unit of competency

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to solve low voltage a.c. circuit problems.	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3	Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
		1.4	The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
		1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
		1.6	Sources of materials that may be required for the work are established in accordance with established procedures.
		1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2	Solve low voltage a.c. circuit problems.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
\		2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.

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ELEMENT	PERFORMANCE CRITERIA	
	2.4	Established methods are used to solve circuit problems from measure and calculated values as they apply to single and three-phase low voltage circuit.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and Solving single and three phase low voltage circuit problems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG102A Alternating current power circuits

Evidence shall show an understanding of alternating currents power circuits to an extent indicated by the following aspects:

T1 Alternating Current Quantities encompassing:

- sine, cosine and tangent ratios of a right angle triangle
- Pythagoras Theorem to a right angle triangle.
- use of the CRO to measure d.c. and a.c. voltage levels

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REQUIRED SKILLS AND KNOWLEDGE

- sinusoidal voltage generated by a single turn coil rotated in a uniform magnetic fields
- terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', 'root-mean-square (r.m.s.) value', in relation to a sinusoidal waveform.
- calculation of the instantaneous value of induced voltage of a generated sinusoidal waveform.
- measurement of instantaneous, peak, peak-to-peak values and the period of a sinusoidal waveform.
- calculation of root-mean-square (r.m.s.) value and frequency of a sinusoidal waveform from values of peak voltage and period.

T2 Phasors Diagrams encompassing:

- purpose of phasor diagrams
- 'in-phase', 'out-of-phase', 'phase angle'' lead' and 'lag'.
- phase angle between two or more alternating quantities from a given sinusoidal waveform diagram.
- convention for representing voltage, current and the reference quantity in a phasor diagram.
- drawing phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current.
- determination of phase relationship between two or more sinusoidal waveforms from a given diagram and measurements.

T3 Single Element a.c. circuits encompassing:

- setting up and connect a single-source resistive a.c. circuit and take voltage and current measurements to determine the resistance
- determining the voltage, current resistances from measure of given values of any tow of these qualities.
- relationship between voltage drops and current in resistive a.c. circuit
- applications of resistive a.c. circuits
- defining ‘inductive reactance’.
- calculation of inductive reactance for a given inductor and the relationship between inductive reactance and frequency.
- applying Ohm’s Law to determine voltage, current of inductive reactance in a purely inductive a.c. circuit given any two to these quantities.
- applications of inductive a.c circuits.
- calculation of capacitive reactance
- applying Ohm’s Law to determine voltage, current or capacitive reactance in a purely capacitive a.c circuit given any two of the quantities.
- applications of capacitive a.c circuits

T4 RC and RL Series a.c. circuits encompassing:

- impedance and impedance triangle.
- determining the impedance, current and voltages for a series RC circuit given the resistance, capacitance and supply voltage.

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REQUIRED SKILLS AND KNOWLEDGE

- drawing and labelling the impedance triangle for a series RC circuit
- drawing phasor diagrams for a series RC circuit
- AS/NZS 3000 requirements for the installation of capacitors.
- examples of capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current.
- determining the impedance, current and voltages for a series RL circuit given the resistance, inductance and supply voltage.
- drawing and labelling the impedance triangle for a series RL circuit
- drawing the equivalent circuit of a practical inductor
- Draw phasor diagrams for a series RL circuit.
- examples of inductive components in power circuits and systems and describe their effect on the phase relationship between voltage and current

T5 RLC Series a.c. circuits encompassing:

- measuring component voltages in a series RLC circuit and using a phasor diagram to determine the supply voltage and phase angle between circuit voltage and circuit current.
- determining the impedance, current and voltages for a series RLC circuit given resistance, inductance, capacitance and supply voltage.
- drawing and labelling the impedance triangle for a series RLC circuit.
- calculation of total impedance for a series RLC circuit.
- calculation of voltage drop for cables using the values for reactance and a.c. resistance from AS/NZS 3008.
- comparison of current limiting characteristics of inductors and resistors.
- practical examples of RLC series circuits

T6 Parallel a.c. Circuits encompassing:

- determining the branch currents of a parallel circuit that contain RL, RC or LC in two branches.
- using a phasor diagram to determine the total circuit current and phase angle in parallel RL, RC or LC circuits.
- determining the total circuit impedance of parallel RL, RC or LC circuits.
- measuring the branch currents in a parallel RLC circuit and use a phasor diagram to determine the total current and phase angle between circuit voltage and circuit current.
- determining the branch impedances, branch currents and phase angles voltages for a parallel RLC circuit given resistance, inductance, capacitance and supply voltage.
- calculation of impedance for a parallel RLC circuit.
- practical examples of parallel circuits.

T7 Power in an a.c. circuit encompassing:

- difference between true power, apparent power and reactive power and the units in which these quantities are measured.
- drawing the power triangle to show the relationships between true power, apparent

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REQUIRED SKILLS AND KNOWLEDGE

power and reactive power
- defining the term "power factor" and phase angle.
- methods used to measure single phase power, energy and demand.

T8 Power Factor Improvement encompassing:

- effects of low power factor.
- requirements for power factor improvement.
- methods used to improve low power factor of an installation.
- local supply authority and AS/NZS 3000 wiring rules requirements regarding the power factor of an installation and power factor improvement equipment.
- methods used to measure single phase power factor.
- using manufacturers catalogues to select power factor equipment for a particular installation

T9 Harmonics and Resonance Effect in a.c. Systems encompassing:

- term "harmonic" in relation to the sinusoidal waveform of an a.c. power system.
- sources in a.c. systems that produce harmonics.
- problems that may arise in a.c. circuits as a result of harmonics and how these are overcome.
- methods and test equipment used to test for harmonics
- methods used to reduce harmonics in a.c. power system
- conditions in a series a.c. circuit that produce resonance.
- dangers of series resonance circuits
- conditions in a parallel a.c. circuit that produce resonance.
- dangers of parallel resonance circuits
- AS/NZS3000 and the local supply authority requirements concerning harmonics and resonance effect in a.c. power systems.

T10 Three Phase Systems encompassing:

- features of a multiphase system.
- comparison of voltages generated by single and multiphase alternators.
- reasons for the adoption of three phases for power systems.
- how three phases is generated in a single alternator.
- Calculation of r.m.s. value of voltage generated in each phase given the maximum value.
- relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each.
- term "phase sequence" (also, referred to as "phase rotation").
- determining the phase sequence of a three phase supply

T11 Three phase star-connections encompassing:

- connecting a three phase star-connection load.
- phase relationship between line and phase voltages and line and phase currents of a

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REQUIRED SKILLS AND KNOWLEDGE

star-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.
- terms "balanced load" and "unbalanced load".
- effect of a reversed phase winding of a star connected alternator.
- example of balanced and unbalanced loads in typical power systems.

T12 Three phase four wire systems encompassing:

- purpose of the neutral conductor in a three phase four wire systems.
- determining the effects of an high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where MEN earthing is employed.
- determining the value and phase relationship of neutral current in an unbalanced three phase four wire systems given line currents and power factors.
- AS/NZS 3000 requirements regarding neutral conductors.
- AS/NZS 3008.1.1 method for determining voltage drop in unbalanced three phase circuits

T13 Three phase delta-connections and Interconnected systems encompassing:

- connecting three phase delta loads.
- phase relationship between line and phase voltages and line and phase currents of a delta-connected system.
- determining the r.m.s. value of line and phase voltage given any one of these quantities.
- determining the r.m.s. value of line and phase current given any one of these quantities.
- limitations and uses of open delta connections
- effect of a reversed phase winding of a delta connected transformer
- example of loads in typical power systems.
- drawing the typical combinations of three phase interconnected systems using star-connections and a delta-connection.
- relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta-connections.

T14 Energy and power requirements of a.c. systems encompassing:

- purposes for measuring power, energy, power factor and maximum demand of a.c. power systems and loads.
- difference between true power, apparent power and reactive power and the units in which these quantities are measured in a three phase system.
- drawing the power triangle to show the relationships between true power, apparent power and reactive power in a three phase system.
- methods used to measure three phase power , energy, power factor and demand.
- determining how the power factor of a three phase installation can be improved.
- using manufacturers catalogues to select measurement equipment for a particular installation

T15 Fault Loop Impedance encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- term fault loop impedance of a a.c. power system
- determining fault loop impedance using resistance and reactance values from AS/NZS 3008.1.1
- measuring fault loop impedance of typical circuits
- procedures for testing fault loop impedance

Evidence Guide

EVIDENCE GUIDE

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9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will

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contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in single and three phase circuits as described as described in 8) and including:

    A Using methodological techniques to solve problems in circuits in a.c. circuits from measure and calculated values

    B Determining the operating parameters of existing circuits

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C Altering an existing circuit to comply with specified operating parameters.

D Developing circuits to comply with a specified function and operating parameters.

E Determining the cause of low power factor in an existing circuit.

F Determining conditions causing an existing circuit to be unsafe.

G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solving single and three phase low voltage circuit problems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

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assessment and relationship with other units	For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to solving problems in a.c. circuit by:

- Determining the operating parameters of existing circuits
- Altering an existing circuit to comply with specified operating 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 includes electric shock hazard from indirect contract with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection.

In relation to the following on more than one occasions:

Single phase circuits

- Connecting single-phase circuits
- Choosing correct instruments
- Taking measurements correctly and accurately.

Three-phase circuits

- Connecting three-phase circuits
- Choosing correct instruments
- Taking measurements correctly and accurately.

AND

At least four of the following applications

- Series a.c. circuits
- Parallel a.c. circuits

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RANGE STATEMENT

- 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

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Custom Content Section

Competency Field **5)**

Electrical

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UEENEEG103A Install low voltage wiring and accessories

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the installation in building and premises of wiring enclosures, cable support systems, cables and accessories and designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories and completing the necessary installation documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits
UEENEEG107A	Select wiring systems and cables for low voltage general electrical installations

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Prerequisite Unit(s) **2)**

UEENEEG108A	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits
UEENEEG109A	Develop and connect electrical control circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to install wiring and accessories.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4 Installation of wiring is prepared in consultation with other affected by the work and sequenced appropriately.
	1.5 The nature and location of the work is determined from documentation or other appropriate person to establish the scope of work to be undertaken.
	1.6 Cable routes are planned within the constraints of the building structure, significants and requirements.
	1.7 Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
	1.8 Tools, equipment and testing devices needed to for the installation work are obtained in accordance with established 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 wiring and accessories.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.

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ELEMENT		PERFORMANCE CRITERIA	
		2.4	Wiring and accessories are installed to comply with technical standards and job specifications and requirements with sufficient excess to affect terminations.
		2.5	Accessories are installed straight and square in the required locations and within acceptable tolerances.
		2.6	Cables and conductors are terminated at accessories in accordance with manufacture's specifications and regulatory requirements.
		2.7	Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken.
		2.8	Defects revealed through on-going compliance and safety inspection and tests are rectified.
		2.9	Cable installation and termination is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits or the surrounding environment and using sustainable energy practices.
		2.10	Unexpected situations are dealt with safely and with the approval of an authorised person.
3	Completion and report installation activities.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	'As-installed' cables/wiring and accessories is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and

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REQUIRED SKILLS AND KNOWLEDGE

installing wiring and accessories for low voltage circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices.

KS01-EG103A Installation of wiring systems

Evidence shall show an understanding of the installation of wiring systems that comply with standards to an extent indicated by the following aspects:

T1 Standards, codes and requirements applicable to the installation of wiring systems encompassing:

- Cables and methods of mechanical protection and support
- Protection against and from other services.
- Prohibited cable locations
- Building codes affecting the installation of cables in buildings, structures and premises (limitation on penetration of structural elements, maintenance of fire protection integrity, 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).

T2 Use of other installation standards called up by the Wiring Rules for special situations encompassing:

- standards that apply to Electromedical treatment areas.
- additional requirements for construction and demolition sites.
- Relocatable installations and their site supply
- additional requirements for caravan park.
- additional requirements for marinas and pleasure craft at low voltage.
- additional requirements for shows and carnivals.

T3 Hazardous areas encompassing:

- Conditions that apply in an areas that require them to be classified as a ‘Hazardous area’.
- Responsibility for classifying a hazardous area
- Awareness of standards called up by the Wiring Rules for selection of equipment and installations in Hazardous areas. (AS/NZS 3000 requirements for hazardous areas).

T4 Requirement for the installation of cables and accessories in damp situations and ELV installations encompassing:

- restricted zones around baths, showers, fixed water containers, pools, sauna heaters and fountains/water features for given installations.
- selecting equipment suitable for installation in given damp situations.
- voltage range that defines extra-low voltage.
- 'Separated extra-low voltage (SELV) system' and a 'Protected extra-low voltage (PELV) system".

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REQUIRED SKILLS AND KNOWLEDGE

- AS/NZS 3000 requirements for selecting extra-low voltage systems and devices for a range of installations and conditions.

T5 Aerial cabling encompassing:

- Describe the types of aerial cabling.
- State the AS/NZS 3000 and local supply authority requirements for aerial cabling.
- Termination of aerial cables in accordance with AS/NZS 3000 and local requirements.
- installation of consumers mains for connection via overhead consumers terminals in accordance with AS/NZS 3000 and local requirements.
- Testing of installed cables compliance with Australian Standards

T6 Underground cabling encompassing:

- Describe permissible underground cabling systems.
- Identify other underground services.
- State the AS/NZS 3000 and local supply authority requirements for underground cabling.
- List the advantages and disadvantages of underground wiring systems
- selection of underground consumers mains in accordance with AS/NZS 3000 and local requirements

T7 Techniques for installing cables and wiring systems encompassing:

- 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.
- Inspecting and testing installed and terminated cables to ensure they comply with continuity and insulation resistance and are safe to connect to the supply.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of 9.1)

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EVIDENCE GUIDE

Assessment

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install wiring and accessories for low voltage circuits as described as described in 8) and including:

    A Reading and interpreting drawings related to cable layouts, cable schedules and apparatus locations.

    B Planning cable routes and obtaining installation materials.

    C Sequencing the installation effectively with other affected by the work.

    D Routing, placing and securing cables in compliance with requirements.

    E Placing and securing accessories accurately.

    F Maintaining fire integrity.

    G Terminating cable and conductors to comply with requirements.

    H Undertaking on-going compliance and safety inspection and testing of installed circuits.

    I Rectifying any defects revealed through on-going inspection and testing

    J Correctly documenting 'as-installed' cables/wiring and

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EVIDENCE GUIDE

accessories.

K Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing wiring and accessories for low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations

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Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to at least three different types of cable enclosure/support systems in combination with four different cable types and circuits for five different purposes as listed below.

Wiring systems enclosures and supports:

- Metallic conduit
- Non-metallic conduit
- Trunking
- Duct
- Cable tray/ladder
- Catenary
- Posts/poles/struts

Cable types:

- Thermoplastic insulated cable (TPI)
- Flat thermoplastic sheathed (TPS)
- Circular thermoplastic sheathed (TPS)
- Steel wire armoured (SWA)
- Fire rated cable (HT or HF or MIMS)
- Flexible cables
- Aerial cable

Circuit purpose:

- Consumers mains
- Submains
- Alternative supply
- Lighting;
- Socket outlets
- Single phase fixed appliance
- Single phase motor
- Three phase motor
- Control

Generic terms used throughout this Vocational Standard shall be regarded as part of the

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RANGE STATEMENT

Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG104A Install appliances, switchgear and associated accessories for low voltage electrical installations

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the installation of appliances protection devices, switchgear, controlgear, switchboards, and accessories designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to installation standards, matching appliances and accessories with that specified, making required circuit connections and completing the necessary installation documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations

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Prerequisite Unit(s) **2)**

UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
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

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

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4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to install appliances, switchgear and associated accessories.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented.
	1.4	Installation is prepared in consultation with others affected by the work and sequenced appropriately.
	1.5	The nature and location of the work is determined from documentation or appropriate person to establish the scope of work to be undertaken.
	1.6	Locations of appliances, switchgear and accessories is planned within the constraints of the building structure, significants and requirements.
	1.7	Material needed for the installation work is obtained in accordance with established procedures and checked against job requirements.
	1.8	Tools, equipment and testing devices needed to for

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ELEMENT	PERFORMANCE CRITERIA	
		the installation work are obtained in accordance with established 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 appliances, switchgear and associated accessories.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.
	2.4	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.
	2.5	Accessories are installed straight and square in the required locations and within acceptable tolerances.
	2.6	Wiring is terminated at appliances, switchgear and accessories in accordance with manufacture's specifications and functional and regulatory requirements.
	2.7	Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories is undertaken.
	2.8	Defects revealed through on-going compliance and safety inspection are rectified.
	2.9	Installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
	2.10	Unexpected situations are dealt with safely and with the approval of an authorised person.

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ELEMENT	PERFORMANCE CRITERIA	
3 Completion and report installation activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.4	'As-installed' appliances, switchgear and accessories is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing low voltage electrical appliance, switchgear and accessories.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices

KS01-EG104A Installation of appliances, switchgear and accessories

Evidence shall show an understanding of the installation of appliances (current-using equipment) and accessories to an extent indicated by the following aspects:

T1 Installation standards, codes and requirements applicable to installing electrical equipment encompassing.

- Protection against thermal effects
- Connection of electrical equipment (appliances, switchgear and accessories include switchgear and controlgear, switchboards, socket-outlets, lighting equipment and accessories, lamps and luminaires, smoke and fire detectors, cooking appliances, appliances producing hot water or steam, room heaters, electric heating cables for floors and ceilings, space heating, duct heaters, electricity converters, motors, transformers, capacitors, and batteries).
- Required and permitted locations current-using equipment and accessories
- Control, switching and over current and RCD protection

T2 Terminal configuration for connection of phase, neutral and protective earthing conductors for each type of equipment.

T3 Building codes affecting the installation of current-using equipment and accessories in buildings, structures and premises encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- maintenance of fire protection integrity, requirements for emergency services (safety services) and the like.

T4 Issues affecting electrical installations in heritage buildings and premises encompassing:

- limitation on types and colour of exposed accessories.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.**1**)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to

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EVIDENCE GUIDE

be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install low voltage electrical apparatus and associated equipment as described as described in 8) and including:

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EVIDENCE GUIDE

A Reading and interpreting drawings related to and apparatus locations and circuit connections.

B Planning installation of appliances, switchgear and accessories and obtaining installation materials.

C Sequencing the installation effectively with other affected by the work.

D Placing and securing appliances, switchgear and accessories accurately in their planned location and in compliance with standards.

E Maintaining fire integrity.

F Terminating and connecting appliances, switchgear and accessories to comply with requirements.

G Undertaking on-going compliance and safety inspections

H Rectifying any defects revealed through on-going inspections

H Correctly documenting 'as-installed' appliances, switchgear and accessories.

I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry

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EVIDENCE GUIDE

practices in relation to installing low voltage electrical apparatus and associated equipment.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG103A Install low voltage wiring and accessories

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to installation and connection of appliances, switchgear and associated accessories as follows:

Each of the following

- Installing and connecting main switches, protective devices and links on a main switchboard and preparing the switchboard for the installation of metering
- Installing and connecting a custom switchboard;
- Socket-outlets;
- Lighting equipment and accessories;

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RANGE STATEMENT

- Luminaires, and

At 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.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

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Custom Content Section

Competency Field **5)**

Electrical

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UEENEEG105A Verify compliance and functionality of low voltage general electrical installations

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit	N/A	Corrected text in Range Statement	

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers inspection and testing to verify whether an electrical installation is safe and complies with all requirements. It encompasses working safely, visual inspections and mandatory, optional and functional testing following verification procedures, identifying non-compliance defects and mandatory reporting requirements.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licencing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology 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 electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG103A	Install low voltage wiring and accessories

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Prerequisite Unit(s) **2)**

UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations
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

2.2) Conditions

- Those holding an 'Unrestricted Electrician's Licence' or equivalent issued in an Australian State or Territory meet the requirements of this unit and its pre-requisite requirements.
- A 'licensed electrician' applying for an 'electrical contractors licence' 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 pre-requisites 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 permanent employment as a licensed electrician sufficient to evidence current knowledge of applicable standards and regulations.

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The

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Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4**)

4.1) **General Application**

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical licence.

Work which requires an electrical licence includes work on and/or supervision of electrical installations at or above low voltage.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to inspect and test an electrical installation.	1.1 OHS measures for the site are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 Documentation or deemed to comply standard on which installation is based is reviewed and understood.
	1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.
	1.6 Tools, equipment and testing devices needed to

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ELEMENT	PERFORMANCE CRITERIA	
		verify compliance are obtained in accordance with established 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 Visually inspect and conduct safety testing on the installation.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.
	2.4	Wiring is checked for suitability for the environments in which they are installed and suitably protected from damage or overheating.
	2.5	Cable conductor sizes are confirmed as meeting current-carrying capacity requirements and voltage-drop and fault-loop impedance limitations.
	2.6	Protection methods and devices are validated as meeting co-ordination requirements for overload and short-circuit protection.
	2.7	Switchgear and control gear is 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	Marking on switchboards are checked for accuracy and clarity and comply with requirements.
	2.11	Mandatory tests are conducted to verify that: earthing conductor resistance is sufficiently low; insulation resistance is sufficiently high; all polarities are correct; and circuit connections are correct as per

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ELEMENT	PERFORMANCE CRITERIA	
		AS/NZS3000.
	2.12	Testing is conducted to verify that: fault-loop impedance is sufficiently low and residual current devices operates as intended as per AS/NZS3000.
3 Report inspection and test findings.	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Non-compliance defects are identified and reported in accordance with established procedures.
	3.4	Recommendations for rectifying defects are made in accordance with established procedures.
	3.5	Mandatory documentation is completed in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and verifying compliance and functionality of general electrical installations.

All knowledge and skills detailed in this unit should be contextualised to current industry standards, technologies and practices.

KS01-EG105A Electrical installations — verification and testing

Evidence shall show an understanding of electrical installations testing and verification to an extent indicated by the following aspects:

T1 Electrical safety encompassing:

- 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 installation compliance inspection and testing.

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REQUIRED SKILLS AND KNOWLEDGE

T2 Legislated regulations encompassing:

- legislation and regulations that require installations 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 tests that show an electrical installation is safe for connection to the supply.
- 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.

T3 Visual inspection of installations for compliance with the Wiring Rules encompassing:

- Protection requirements
- General condition
- Consumers mains/submains
- Switchboards
- Wiring systems
- Equipment and accessories
- Earthing

T4 Testing installations encompassing:

- 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 mains, submains and final subcircuits is correct; there is no transposition of earthing and neutral conductors; fault-loop impedance is sufficiently low; RCD 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.

T5 Documentation encompassing:

- results of tests conducted on an installation to comply with requirements and ensure the installation is safe.
- documents of the results of testing an installation as required by the local supply authority.
- documents of periodic inspection and testing of construction site wiring and equipment in accordance with requirement.
- documents of periodic testing and inspection of electrical equipment including tagging requirements.

KS02-EG105A Electrical installations and equipment — principles and requirements

Evidence shall show an understanding of electrical installations and equipment principles

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REQUIRED SKILLS AND KNOWLEDGE

and requirements to an extent indicated by the following aspects:

T1 Effects of electric current encompassing:

- Physiological effects of current.
- Basic principles by which an electric current can produce heat, light, motion and a chemical reaction.

T2 Single path practical circuit encompassing:

- 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.

T3 Single-source multiple-path d.c. circuits encompassing:

- Circuit configurations and connection.
- Relationship between the parameters of voltage, current, resistance and power dissipation in the 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.

T4 Alternating voltage and current generation, phase relationships, energy in an a.c. circuit encompassing:

- 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-phases 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.

T5 Fundamental safety principles of the AS/NZS 3000 Part 1 (Section 1) and deemed to comply solution given in Part 2 encompassing:

- 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.

T6 Electric motor selection, starting method and overload protection encompassing:

- 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.

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REQUIRED SKILLS AND KNOWLEDGE

- Thermal, magnetic and thermistor overload protection methods.

T7 Ability to apply AS/NZ 3000 requirements for protective and functional earthing encompassing:

- 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.

T8 MEN system and its application encompassing:

- The roles of the protective earthing (PE) and neutral (N) conductors in an 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.
- 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.
- The requirements for installation of an MEN link in an installation and an outbuilding.

T9 Knowledge of the application of transformers encompassing:

- 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.
- AS/NZS 3000 requirements and restriction on the installation and use of transformers.

T10 Ability to apply AS/NZ 3000 requirements for protection of circuit against overcurrent and abnormal voltages encompassing:

- 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 devices.
- Causes of over and undervoltage.
- Device and requirements for protection against over and undervoltage.

T11 Additional protection by use of RCDs and use of extra-low voltage for basic and fault protection encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- Limitation of an RCD to protect against contact with live parts
- AS/NZS 3000 requirements for use of RCDs.
- Conditions for use of extra-low voltage to provide for basic and fault protection
- AS/NZS 3000 requirements for installation of SELV and PELV systems

T12 Ability to select cables for single and three phase mains and sub-mains for single and multiple installations that comply with requirements of AS/NZS 3000 and AS/NZS 3008.1 encompassing:

- Methods of determining maximum demand.
- Types of cables available.
- Installation methods and external influences effecting cable current-carrying capacity
- Voltage drop limitation
- Short-circuit performance consideration.

T13 Ability to select cables for final sub-circuits that comply with requirements of AS/NZS 3000 and AS/NZS 3008.1 encompassing:

- Maximum demand of final sub-circuits.
- Types of cables available.
- Installation methods and external influences effecting cable current-carrying capacity
- Effect of earth-fault loop impedance and voltage drop limitations on circuit route length.
- Short-circuit performance considerations.

T14 Ability to apply AS/NZS 3000 requirements for control and protection of installations encompassing:

- 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.

T15 Ability to apply AS/NZS 3000 requirements for the installation of electrical equipment in given damp situations encompassing:

- Limitation of installation of equipment in classified zones.
- Selection and location of equipment suitable for installation in given classified zones.
- Additional protection by RCD.
- Equipotential bonding in showers and bathrooms and swimming and spa pools.

T16 Ability to install, modify and test electrical equipment for construction and demolition sites, complying with AS/NZS 3012 and applicable workplace safety legislation encompassing:

- Supply and installation requirements.
- Protection of circuits.

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REQUIRED SKILLS AND KNOWLEDGE

- Initial and periodic inspection and testing
- Portable tool safety testing and tagging system in accordance with AS/NZS 3760.

T17 Knowledge of AS/NZS 3000 requirements for the installation of aerial conductors and underground wiring encompassing:

- 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 layer and protection
- Underground wiring clearances from other services

T18 Knowledge of AS/NZS 3000 requirements for electrical installations in hazardous areas encompassing:

- Types of areas classified as a hazardous area
- Standards to which the selection, installation and maintenance of electrical equipment shall comply.
- Additional training required to work competently with electrical equipment for hazardous areas
- T19 Ability to verify compliance of an electrical installation in accordance with AS/NZS 3000 encompassing:
- Visual inspection to determine whether the installation complies with requirements set out in Section 2 to 7 of AS/NZS 3000 and relevant specific installation standards.
- Mandatory tests following guidance given in AS/NZS 3017

T20 Ability to perform effective safe isolation of any equipment encompassing:

- 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

T21 Ability to apply AS/NZS 3000 requirements to install and terminate thermoplastic insulated cables; elastomer sheathed cables; XLPE sheathed cables; and high temperature cables; armoured cables; and neutral screened cables in a wide range of applications.

T22 Ability to perform the circuit tests required for electrical cables in a range of installations and final sub-circuit encompassing:

- 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.

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REQUIRED SKILLS AND KNOWLEDGE

T23 Ability to install final sub-circuit wiring into switchboards and connect to switchboard equipment in accordance with AS/NZS 3000 and electricity distributor's requirements.

T24 Ability to apply AS/NZS 3000 and electricity distributor's requirements for the installation and connect consumers mains encompassing:

- Installing of underground and overhead consumers mains
- Terminating consumers mains at pillars, pits mains connection boxes and consumers switchboard.
- Install unprotected consumers mains to reduce the risk of short-circuit current to a minimum.
- Installing bonding conductors where required.

T25 Ability to read, sketch and interpret electrical diagrams encompassing:

- 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

T26 Knowledge and understanding occupational safety and health encompassing:

- Basics of Occupational Safety and Health regulations
- Legal responsibilities for employers and employees
- Employers' and employees' own "duty of care".
- Safety committees and their role

T27 Knowledge and understanding of the requirements for personal safety in the workplace encompassing:

- Purpose and use of Safe Work Method Statements (SWMS) or Job Safety Analysis (JSA).
- Purpose and process of reporting 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.

T28 Process in rescuing a person in contact with live electrical conductors or equipment and the primary importance of the safety of the rescuer.

T29 Application of emergency first aid requirements for an electric shock victim encompassing:

- Calling for help.
- Applying cardiopulmonary resuscitation (CPR).
- Selection and use of fire extinguishers to control electrical fire at accident site.

T30 Dangers of high voltage equipment and distribution systems encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- 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.

T31 Systematic method of commissioning and decommissioning electrical equipment and installations encompassing:

- 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.

T32 Diagnosing and rectifying faults in electrical apparatus and associated circuits encompassing:

- Faults such as open-circuit; short-circuit; incorrect connections; insulation failure; unsafe condition; apparatus/component failure; 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.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1**) Longitudinal competency development approaches to assessment,

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EVIDENCE GUIDE

such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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EVIDENCE GUIDE

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Verify compliance and functionality of general electrical installations as described as described in 8) and including:
    - A Selecting correct tools and testing equipment.
    - B Identifying visual non-compliance defects.
    - C Using effective methods for conducting mandatory and optional tests.
    - D Identifying non-compliance from test results.
    - E Identifying causes of non-compliance.
    - F Completing mandatory reporting.
    - G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

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Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to verifying compliance and functionality of general electrical installations.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to verifying compliance and functionality of at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a safety system.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other

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RANGE STATEMENT

terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.3) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.3) Literacy and numeracy skills

Competency Field **5**)

Electrical

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UEENEEG106A Terminate cables, cords and accessories for low voltage circuits

Modification History

Release	Action	Core/Elective	Details	Points
3	Edit		In Pre-requisites, edit code to reflect correct unit title UEENEEE107A Use drawings, diagrams, schedules, standards, codes and specifications	
3	Edit		In Pre-requisites, edit name to reflect correct unit title UEENEEE102A Fabricate, assemble and dismantle utilities industry components	

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers the termination of cables and cords and their conductors at accessories and current-using devices designed to operate at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely and to standards, understanding wiring system and cable types and applications, selecting appropriate termination accessories, preparing and terminating cables and cords, terminating cables/cord conductors and ensuring completed termination complies with requirements.

Application of the Unit

Not Applicable

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Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications

Employability Skills Information

Employability Skills **3)**

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This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to terminate cables, cords and conductors	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards that have not previously been identified are noted and established risk control measures are implemented.

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ELEMENT		PERFORMANCE CRITERIA	
		1.4	The junction box/ terminal enclosures and terminal types are inspected to select the type and size of cable and conductor termination devices needed.
		1.5	Tools, materials and testing devices needed to for terminating cables and cords are obtained in accordance with established procedures and checked for correct operation and safety.
2	Terminate cables, cords and conductors	2.1	OHS risk control measures and procedures for carrying out the work are followed.
		2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.3	Cable/cord ends are cut and sheath/insulation stripped with sufficient length to prevent stain on terminations and without undue waste.
		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 type of terminal at which there are to be connected.
		2.6	Conductors are terminated to ensure continuity across the terminal.
		2.7	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.
		2.8	Unexpected situations are dealt with safely and with the approval of an authorised person.
3	Test terminated cables and cords	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Terminated cables are tested to ensure continuity and insulation resistance comply with requirements.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and terminating cables, cords and accessories for low voltage circuits.

The knowledge and skills shall be contextualised to current industry standards, technologies and practices.

KS01-EG106A Wiring systems types, application and terminations

Evidence shall show an understanding of wiring systems types, application and terminations to an extent indicated by the following aspects:

T1 Cable types and terminations encompassing:

- cable variates (single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables)
- structural components of cables and their purpose (conductor material, stranding, insulation type, voltage rating, screening, sheathing, armour and serving)
- Australian and International colour standards for cords and cables
- construction of common cables
- identification of cords and cables by conductor size, type and rating
- application of various cords and cables types
- identification of hardware used in terminating cords and cables
- preparation and termination of cords and cables
- termination of cords and cables using crimp lugs, tunnel connectors, soldering and solderless lugs
- 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).

T2 Cords, cables and plugs encompassing:

- selection of flexible cords for given applications
- preparation of cord ends for connection
- fitting standard three pin plug tops to a flexible cords
- fitting standard three pin extension sockets to a flexible cords
- connecting variety of plugs to different flexible cord types
- requirements of AS/NZS 3000 for flexible cords, cables and plugs
- using test equipment to test and locate various faults in flexible cords and cables.

T3 Flat TPS wiring systems encompassing:

- Australian Standards requirements for the termination and protection of flat TPS cable

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REQUIRED SKILLS AND KNOWLEDGE

- Installation of flat TPS cable in trunking and duct for the supply of socket outlets
- using flat TPS cable for lighting looms
- testing circuits to ensure they are safe and operate as intended

T4 Circular TPS wiring systems encompassing:

- Australian Standards requirements for the installation of circular TPS cable
- installation of circular TPS cables on cable ladder/tray
- installation of circular TPS cable
- testing circuits to ensure they are safe and operate as intended

T5 Thermoplastic insulated cables in non-metallic enclosures encompassing:

- Australian Standards requirements for the installation of non-metallic enclosures
- cutting and setting rigid non-metallic ducting, trunking and conduit and accessories
- installation of circuits using TPI cables in non-metallic enclosures
- testing circuits to ensure they are safe and operate as intended

T6 Thermoplastic insulated cables in metallic enclosures encompassing:

- Australian Standards requirements for the installation of metallic enclosures
- fitting metallic conduit to metallic trunking and accessories
- cutting, threading and setting metallic conduit
- installation of circuits using thermoplastic insulated cables in metallic conduit, ducting and trunking
- testing circuits to ensure they are safe and operate as intended

T7 Fire protection cabling and systems encompassing:

- Australian Standards requirements for the installation of fire protection cable and mineral insulated metal sheathed cables
- requirements when passing a wiring system through a fire rated wall or floor
- recognising different fire protection cable types including Pyrolex, Radox and MIMS
- termination of fire protection cable.
- installation of circuits using fire protection cable.
- testing circuits to ensure they are safe and operate as intended

T8 Steel wire armoured (SWA) cables encompassing:

- Australian Standards requirements for the installation of SWA cables
- identifying accessories used with SWA cables
- installation of circuits using SWA cables
- testing circuits to ensure they are safe and operate as intended

T9 Trailing cables and catenary systems encompassing:

- Australian Standards requirements for the installation of trailing cables and catenary wiring

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REQUIRED SKILLS AND KNOWLEDGE

- identifying equipment used with trailing cable and catenary systems
- installation of catenary wiring systems
- installation of trailing cable systems supplying pendant sockets
- testing the installation to ensure it is safe and operates as intended

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.**1**)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

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EVIDENCE GUIDE

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

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EVIDENCE GUIDE

- Install wiring and accessories for low voltage circuits as described as described in 8) and including:

A Selecting appropriate cable/cord and conductor devices

B Cutting cable ends and stripping sheath/insulation to a sufficient length

C Fitting and securing cable glands/retaining devices correctly

D Preparing and terminating conducts to suit the type of terminal at which there are to be connected.

E Testing completed cables to ensure compliant continuity and insulation resistance

F Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing wiring and accessories for low voltage circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

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Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated by terminating at least five different types of cables each at a junction box and a device terminal enclosure.

Cable types with copper conductors:

- Thermoplastic insulated cable (TPI)
- Flat thermoplastic sheathed (TPS)
- Circular thermoplastic sheathed (TPS)
- Steel wire armoured (SWA)
- Mineral insulated metal sheathed (MIMS)
- Flexible cables
- Flexible cords
- Aluminium conductor/cable

AND

Terminate their conductors at each of the follow

Terminal types

- Tunnel terminal
- Stud terminal

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RANGE STATEMENT

- Screw terminal

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Custom Content Section

Competency Field **5)**

Electrical

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UEENEEG107A Select wiring systems and cables for low voltage general electrical installations

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers selecting wiring systems and cables for electrical installations operating at voltages up to 1,000V a.c. or 1,500 V d.c. It encompass knowledge and 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, coordination between protective devices and conductors and documenting selection decisions

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Practice in 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.

Note:
1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work

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1.2) License to practice

platforms, 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.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits

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Prerequisite Unit(s) **2)**

UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4)**

4.1) General Application

This unit applies to competency development entry-level employment based programs incorporated in approved contracts of training.

4.2) Importation

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to select wiring systems and cables for general electrical installations	1.1 The extent and nature of the electrical installation is determined from job specifications.
	1.2 Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
	1.3 Cable routes, the route lengths of cables and the conditions in which the wiring system is to operate is determined from job specifications or from consultation with appropriate persons.
2 Select wiring systems and cables for general electrical installations	2.1 Wiring systems are selected for suitability for the environments in which they are to operate.
	2.2 Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations.
	2.3 Circuit protective devices are selected to meet requirement for co-ordination with conductor current-carrying capacity.
	2.4 Earthing system components are selected to meet requirements of an MEN system.
	2.5 Evidence is obtained that electrical equipment selected complies with safety requirements.
3 Document electrical installation.	3.1 Evidence is obtained from manufacturers/suppliers that electrical equipment selected complies with safety requirements.
	3.2 Reasons for selections made, including calculations, are documented in accordance with established procedures.
	3.3 Electrical installation arrangement and specifications for all selected items are documented in accordance with established procedures and forwarded to appropriate person(s).

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of selecting wiring systems and cables for general electrical installations.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG107A Electrical installation — cable selection and co-ordination

Evidence shall show an understanding of selecting cables and ensuring co-ordination between protection device and conductors in electrical installations that comply with the Wiring Rules, Selection of cables standards and Service Rules to an extent indicated by the following aspects:

T1 Performance requirements - design and safety encompassing:

- harmful effects against which the design of an electrical installation must provide protection.
- performance standards of a correctly functioning electrical installation.
- supply characteristics that shall be considered when designing an electrical installation.
- acceptable methods for determining the maximum demand in consumer's mains and sub-mains.
- AS/NZS 3000 requirements limiting voltage drop in an installation.
- reason for dividing electrical installations into circuits and the factors that shall determine their number and type.
- typical external factors that may damage an electrical installation and that shall be considered in the installation design.
- methods for protecting persons and livestock against direct and indirect contact with conductive parts and the typical application of each.
- acceptable methods of protection against the risks 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.
- acceptable methods for protecting persons and livestock against injury and property against damage from the effects of over current.
- requirement for protection against fault current.
- requirement 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 achieved.
- features of 'fire rated construction' and how the integrity of the fire rating can be maintained in relation to electrical installation.

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REQUIRED SKILLS AND KNOWLEDGE

T2 Final subcircuit arrangements encompassing:

- factors that shall 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 or a particular installation.
- current requirements for given final subcircuits.
- layout/schedule of circuits for given installations.

T3 Factors affecting the suitability of wiring systems encompassing:

- wiring systems typically used with various construction methods and particular 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.

T4 Maximum demand on consumer’s mains/submains encompassing:

- acceptable methods for determining the maximum demand on an installation’s consumer’s mains and submains.
- maximum demand for the consumer's mains for given installations up to 400 A per phase.
- maximum demand for given submains.

T5 Cable selection based on current carrying capacity requirements encompassing:

- installation conditions for a range of wiring systems and applications.
- external influences that require the use of a derating factor.
- AS/NZS 3000 requirements for coordination of cables and protection devices.
- AS/NZS 3008 used to select conductor size based on the maximum current requirement for a given installation condition including any applicable derating factors.

T6 Cable selection based on voltage drop requirements encompassing:

- AS/NZS 3000 requirements for maximum voltage drop in an installation.
- relevant tables in AS/NZS 3008 for unit values of voltage drop.
- calculation of the expected voltage drop in a given circuit.
- selecting cables to satisfy voltage drop requirements in addition to current carrying capacity requirements.

T7 Cable selection based on fault loop impedance requirements encompassing:

- AS/NZS 3000 requirements for maximum fault loop impedance in an installation.
- relevant tables in AS/NZS 3008 to determine cable impedances.

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REQUIRED SKILLS AND KNOWLEDGE

- calculation of the expected fault loop impedance for a given circuit arrangement.
- selecting cables to satisfy fault loop impedance requirements in addition to current carrying capacity requirements and voltage drop requirements.

T8 Selecting protection devices encompassing:

- 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 ensures the protection of cables from over heating due to over current.
- 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.

T9 Selecting devices for isolation and switching encompassing:

- 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.

T10 Switchboards encompassing:

- 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.
- layout of a main switchboard for an installation supplied with single phase multiple tariff whole current metering.
- layout of a main switchboard for an installation supplied with multiphase single tariff whole current metering.
- layout of a main switchboard for an installation supplied with multiphase 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 CT metering.
- local supply authority requirements for connection of an electrical installation to the electrical supply system

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Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

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EVIDENCE GUIDE

competency in this unit

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Selecting wiring systems and cables for general electrical installations as described as in 8) and including:

    A Determining the extent and nature of the installation for job specifications

    B Obtaining and understand the safety and other regulatory requirements to which the electrical installation shall comply

    C Determining cable routes, the route lengths of cables and the conditions in which the wiring system is to operate.

    D Selecting wiring system suitable for the environment requirements.

    E Selecting cable conductors sizes in consideration to current-carrying capacity and voltage-drop / earth

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EVIDENCE GUIDE

fault-loop limitation.

F Ensuring co-ordination between circuit protective device and conductor current-carrying capacity.

G Selecting compliant earthing system components

H Documenting wiring systems and cables to be used, specification for items selected and reasons for the selections made.

I Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to selecting and arranging equipment for general electrical installations.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

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EVIDENCE GUIDE

assessment and relationship with other units	For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:	
	UEENEE063A	Arrange circuits, control and protection for general electrical installations

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to selecting and selecting wiring systems and cables for at least two general electrical installations comprising a main switchboard, supplying more than one circuit each for, lighting, socket outlets, and fixed appliances. One of the installations shall include a distribution board separate from the main switchboard and at least one circuit supplying a three-phase load and a fire pump.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

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Custom Content Section

Competency Field **5)**

Electrical

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UEENEEG108A Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers trouble-shooting and repairing faults in electrical apparatus and interconnecting circuits and equipment operating at voltages up to 1,000 V a.c. or 1,500 V d.c. It encompasses working safely, reading circuit diagrams, sketching diagrams from traced wiring, logically applying fault finding procedures, conducting repairs and completing the necessary service documentation.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities components
UEENEEE104A	Solve problems in d.c. Circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG033A	Solve problems in single and three phase electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
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

2.2) Literacy and numeracy skills

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Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

Employability Skills Information

Employability Skills **3**)

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4**)

4.1) **General Application**

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) **Importation**

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to trouble-shoot and	1.1	The extent and nature of the electrical installation is determined from job

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ELEMENT	PERFORMANCE CRITERIA	
rectify faults.		specifications.
	1.2	Safety and other regulatory requirements to which the electrical installation shall comply area are identified, obtained and understood.
	1.3	OHS procedures for a given work area are identified, obtained and understood.
	1.4	OHS risk control measures and procedures in preparation for the work are followed.
	1.5	The likely extent of work to be undertaken is envisaged from fault/breakdown reports and/or discussions with appropriate person(s).
	1.6	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
2 Trouble-shoot and repair faults.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.
	2.4	Safety hazards resulting from the fault or breakdown are documented and risk control measures devised and implemented in consultation with appropriate personnel.
	2.5	Trouble-shooting is approached methodically drawing on knowledge of electrical circuits and apparatus using measured and calculated 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	Faulty circuits/components are rechecked and

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ELEMENT	PERFORMANCE CRITERIA	
		their fault status and acquired.
	2.8	Materials/replacement parts required to rectify faults 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 an authorised person.
	2.12	Trouble-shooting and repair activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Completion and report trouble-shoot and repair activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work area is cleaned and made safe in accordance with established procedures.
	3.3	Written justification is made for repairs to apparatus.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

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REQUIRED SKILLS AND KNOWLEDGE

Evidence shall show that knowledge has been acquired of safe working practices and trouble-shooting and repairing faults in electrical apparatus and circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG108A Electrical circuit and equipment faults and fault finding techniques

Evidence shall show an understanding of electrical circuit and equipment faults and fault finding techniques to an extent indicated by the following aspects:

T1 Troubleshooting concepts encompassing:

- 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), supply faults.
- typical faults symptoms and their causes: operation of circuit protective device, appliance does not operate, single phase motor does not develop enough torque to drive the load, three phase motor does not develop enough torque to drive the load, motor overload trips
- 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
- effect to cause reasoning — assumptions of possible causes
- methods for testing assumptions: visual inspection, component isolation, test equipment, sectional testing, split-half tests
- repairing the fault and the steps needed to ensure fault doesn’t re-occur
- dealing with intermittent faults (typical causes of intermittent faults are vibration, shock, changes in temperature and electromagnetic interference).
- final testing and re commissioning

T2 Troubleshooting water heater and appliance circuits/equipment encompassing:

- circuit diagrams of common single phase and three phase hot water systems
- single phase and three phase element resistance values (determined from measurement and calculation from power and voltage ratings)
- testing single and three phase elements for correct insulation resistance and continuity
- element replacement techniques
- operation of thermostats, thermal cut-outs and pressure relief valves, flow switches and checking sacrificial anodes
- locating faults in common single and three phase hot water systems
- repairing faulty water heating systems

T3 Troubleshooting electrical appliance circuits/equipment encompassing:

- circuit diagrams of common single phase and three phase appliances
- methods to determine the cause of an RCD operation

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REQUIRED SKILLS AND KNOWLEDGE

- identification of appliances that is causing an RCD to trip
- testing single and three phase appliances for correct insulation resistance and continuity
- operation of appliances controls
- locating faults in common single and three phase appliances
- repairing faulty appliances

T4 Troubleshooting lighting circuits encompassing:

- circuit and wiring diagrams of common lighting circuits including single light controlled by a single switch, multiple lights controlled by a single switch, two and three way switching using the loop at the light method and the loop at the switch method.
- causes of wiring faults from supplied symptoms and circuit and/or wiring diagrams
- causes of faults in ELV lighting devices, include transformer (iron core or electronic), voltage drop, heat, over-voltage, poor connections, incompatible dimmers
- diagrams of a basic fluorescent light circuit including lamp, ballast and starter
- locating faults in fluorescent light circuits
- operation of a range of lighting control including passive infra-red (PIR), dimmers, photo electric or day-light switches and time clocks
- locating faults in lighting control circuits

T5 Troubleshooting single phase motor and control circuits encompassing:

- circuit diagrams of split phase, capacitor start, capacitor start capacitor run, universal and shaded pole single phase motors
- causes of single phase motor faults from supplied symptoms and circuit diagrams
- causes of electrical faults in single phase motors, include open and partially open circuit winding, short and partially short circuit winding, open circuit rotor, burnt out winding, coil shorted to frame.
- reasons for a thermal overload trip and how often they are to be reset before investigating a cause
- internal mechanical faults and their consequences, include bearings, fans, bent shaft, locked rotor, blocked air vents, centrifugal switches, environmental factors
- faults on driven loads and couplings and their consequences, include slipping belts, poorly aligned coupling (shims), vibration, loads bearing failing, load stalling.
- locating faults in single phase motors and their controls

T6 Troubleshooting three phase induction motor encompassing:

- circuit diagrams of three phase induction motors
- causes of three phase motor faults from supplied symptoms and circuit diagrams
- causes of electrical faults in three phase motors, include open and partially open circuit phase winding, short and partially short circuit phase winding, open circuit rotor, burnt out phase winding, coil shorted to frame.
- reasons for a thermal overload trip and how often they are to be reset before investigating a cause
- internal mechanical faults and their consequences, include bearings, fans, bent shaft, locked rotor, blocked air vents, environmental factors.

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REQUIRED SKILLS AND KNOWLEDGE

- faults on driven loads and couplings and their consequences, include slipping belts, poorly aligned coupling (shims), vibration, loads bearing failing, load stalling.
- locating faults in three phase induction motors and their controls

T7 Troubleshooting electrical installations encompassing:

- circuit diagrams, wiring diagrams, cable schedules and specifications of electrical installations
- causes of electrical installation faults from supplied symptoms and circuit diagrams include open and partially open circuit wiring, short and partially short circuit wiring, low insulation resistance, incorrect polarity, transposition of conductors, RCD tripping.
- locating faults in electrical installations
- repairing faulty electrical installation circuits components and wiring.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required

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and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
    - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
    - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
    - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
    - Demonstrate an appropriate level of skills enabling employment
    - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:

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EVIDENCE GUIDE

- Find and repair faults in electrical apparatus and circuits as described as described in 8) and including:

  A Envisaging the likely extent of the fault and the work from fault/breakdown reports and/or discussion to elicit information on the fault/breakdown with appropriate person(s).

  B Using appropriate tools and resources, and methodical fault finding techniques.

  C Locating and trouble-shooting faults efficiently.

  D Conducting tests or measurements in strict accordance with OHS and electrical safe working requirements.

  E Rectifying faults effectively.

  F Reporting cause of the fault and justifying the repairs undertaken.

  G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to trouble-shooting and repairing faults in electrical apparatus and circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3

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'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.**5**)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG109A	Develop and connect electrical control circuits t

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in trouble-shooting and repairing faults in electrical apparatus and circuits designed for voltages up to 1000 V a.c. or 1500 V d.c in at least:

Four of the following **equipment and associated circuit**

- Switchboards
- Protective devices
- Lighting
- Heating
- Socket outlets
- Control devices

and

Three of the following **machines and associated control circuits**

- Single phase motors
- Single phase motor controls
- Three phase motors

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RANGE STATEMENT

- Three phase motor controls
- Synchronous machines
- DC machines
- DC machines controls
- Transformers and auxiliary components

Notes.

1. The different types of faults include; Open-circuit; Short-circuit; Incorrect connections; Insulation failure; Unsafe condition; Apparatus/component failure; Related mechanical failure; Other electrical apparatus and circuit faults

2. Examples of apparatus are Control devices; Fixed appliances/accessories; Lighting; Single phase motors and their controls; Socket outlets Three phase motors and their controls, synchronous machines and their controls, transformers and their controls, switchboards and/or distribution boards and their controls, protection and/or metering devices, a.c./d.c. machines and their controls other like equipment/accessories.

3. Examples of circuits include those supplying fixed appliances; lighting; single-phase motors; socket outlets; three phase motors and controls circuits; machines and transformers; electronic or computer based equipment other like equipment/accessories.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

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Custom Content Section

Competency Field **5)**

Electrical

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UEENEEG109A Develop and connect electrical control circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers developing, connecting and functionally testing electrical power and control circuits that perform specific control functions. It encompasses working safely; developing schematic/ladder diagrams and converting them to wiring diagrams; selecting and connecting contactors and control devices to perform a specific function.

Application of the Unit

Not Applicable

Licensing/Regulatory Information

1.2) License to practice

During Training: Competency development activities are subject to regulations directly related to licensing, occupational health and safety and where applicable contracts of training such as apprenticeships.

In the workplace: The application of the skills and knowledge described in this unit require a license to practice in the workplace where work is carried out on electrical equipment or installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.

Other conditions may apply under State and Territory legislative and regulatory requirements.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEG006A	Solve problems in single and three phase low voltage machines
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
UEENEEG106A	Terminate cables, cords and accessories for low voltage circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of

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competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Application of the Unit **4**)

4.1) **General Application**

This unit applies to all qualifications, competencies and/or Skill Sets which require an electrical license.

4.2) **Importation**

RTOs wishing to import this unit into any qualification under the flexibility provisions of NQC Training Package Policy

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Develop and prepare to connect electrical control circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.
	1.4 Control scenarios are determined from discussions with appropriate person(s) and documented in accordance with established procedures.

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ELEMENT	PERFORMANCE CRITERIA	
	1.5	Agreement for the control scenarios is sought from appropriate person(s) and documented in accordance with established procedures.
	1.6	Schematic arrangement of control circuits that complies with agreed scenarios is documented in accordance with established procedures.
	1.7	Materials needed to connect control circuits are obtained in accordance with established procedures and checked against job requirements.
	1.8	Tools, equipment and testing devices needed to connect control circuits are obtained in accordance with established 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 Connect and test electrical control circuits.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.
	2.4	Control circuit components are connected to comply with the agreed control scenario.
	2.5	Control circuit operation is tested for agreed functionality and in strict accordance with OHS requirements and established safety procedures.
	2.6	Non-compliant control functions are rectified to comply with the agreed control scenario.
	2.7	Unexpected situations are dealt with safely and with the approval of an authorised person.

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ELEMENT	PERFORMANCE CRITERIA	
	2.8	Control circuits are connected and tested efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practice.
3 Completion and document circuit development activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	'As-connected' control circuits are documented using standard drawing conventions and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and connecting control circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG109A Electrical control devices and circuits

Evidence shall show an understanding of electrical control devices and circuits to an extent indicated by the following aspects:

T1 Basic relay circuits encompassing:

- Identification of given circuit diagrams (schematic) symbols and explain the operation of the components represented
- labelling wires and terminal (numbering systems)
- control relay - operating principles, basic contact configurations and identification and common applications
- push button - switching configurations and common applications
- selecting pushbuttons/pilot lamps from manufacturer’s catalogues for specific

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REQUIRED SKILLS AND KNOWLEDGE

applications

- development of simple stop-start relay circuit that incorporates pilot lights and latching circuit.
- connection and testing of control circuits

T2 Relay circuits and drawing conventions encompassing:

- circuit diagram drawing conventions
- selecting relays from manufacturers' catalogue for specified applications
- circuit development of electrical control circuit in accordance with a written description (specification) and list the sequence of operation of the circuit
- connecting simple electrical control circuit from circuit diagrams
- applying safe working practices when testing an electrical control circuit

T3 Remote STOP-START control and electrical interlocking encompassing:

- operation of local and remote start-stop control of relays
- operation of an electrically interlocked relay circuit
- development of a relay circuit incorporating local and remote start and stop buttons and electrical interlocking.
- connecting electrical circuits with local and remote start-stop control and with electrical interlocking.
- applying circuit checking and testing techniques to an electrical control circuit.

T4 Time delay relays encompassing:

- timers - operating principles, basic contact configurations and identification and common applications
- selecting timers for specified functions from manufactures' catalogues
- development of timer controlled circuits from a written description and list the sequence of circuit operation
- connecting a timer controlled circuit using a circuit diagram as a guide.
- timer circuit checking and testing procedures.

T5 Circuits using contactors encompassing:

- contactors - operating principles, basic contact configurations and identification and common applications
- thermal overloads - operating principles, basic contact configurations and identification and common applications
- circuit diagram symbols
- circuit development using a contactor
- using contactors for motor control.
- compliance requirements for devices for isolating circuits.

T6 Jogging and interlocking encompassing:

- purpose and application of jogging control of motors
- operation of motor control using start, stop and jog buttons

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REQUIRED SKILLS AND KNOWLEDGE

- purpose and application of electrical/mechanical interlocking
- developing a multiple motor starting circuit from a description of the circuit operation including jog and interlock functions.
- selecting circuit components using manufacturers' catalogues for appropriate duty ratings
- connecting and testing a multiple motor starting circuit which incorporates start, stop and jog control.

T7 Control devices encompassing:

- 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
- selecting control devices using manufacturers' catalogues for specified applications
- connection of control devices into control circuits

T8 Programmable relays encompassing:

- programmable relays - advantages over electromagnetic relay circuit control.
- typical applications of programmable relays.
- block diagram representation and basic operating principles
- input and output parameters, listing, connections and output types.
- connecting input and output devices to a programmable relay using a diagram
- 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
- installation of programmable control relays
- common faults and their symptoms

T9 Three-phase induction motor starters encompassing:

- reasons for limiting the starting current of large motors.
- requirements of the wiring rules (AS/NZS 3000) and the local supply authority service rules, with regard to starting and control of induction motors.
- DOL starter operating principles, applications and circuits
- electronic (soft) starter operating principles, applications and circuits
- connecting a DOL motor starter and testing the operation of the power and control circuits

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REQUIRED SKILLS AND KNOWLEDGE

- installation of DOL and soft starters

T10 Three-phase induction motor starters- reduced voltage encompassing:

- star-delta starter operating principles and circuits
- primary resistance starter operating principles and circuits
- auto-transformer starter operating principles and circuits
- secondary resistance starter operating principles and circuits
- common applications for each starter type
- comparison of motor starters basic characteristics
- selecting the most suitable motor starter for a given situation
- connecting motor starter power and control circuits for correct operation
- measuring starting current and torque of selected motor starters
- installation of reduced voltage starters

T11 Three-phase induction motor reversal and braking encompassing:

- reversing operating principles and control circuits
- plug braking operating principles and circuits
- dynamic braking operating principles and circuits
- regenerative braking operating principles and circuits
- eddy current brakes operating principles and circuits
- mechanical brakes operating principles and circuits
- comparison of the difference braking methods used.
- typical applications for each braking method.
- connecting a circuit with a braking feature to operate a three-phase motor.
- installation of motor braking control circuits

T12 Three-phase induction motor speed control encompassing:

- pole changing operating principles and circuits
- variable frequency drives operating principles and circuits
- slip-ring motors operating principles and circuits
- installation of motor speed controllers.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with

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EVIDENCE GUIDE

all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function

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and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Develop and connect control circuits as described as described in 8) and including:
    - A Determining control scenarios specifications.
    - B Developing schematic arrangement of control circuits that meets the required scenario as specified.
    - C Connecting control circuit to function as specified.
    - D Conducting safety and functional testing correctly
    - E Identifying and correcting non-compliant control functions.
    - F Documenting 'as-connected' control circuit.
    - G Dealing with unplanned events

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

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EVIDENCE GUIDE

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to development and connecting electrical control circuits.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEG108B	Trouble-shoot and repair faults in low voltage electrical apparatus and circuits

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to developing, connecting and safety and functional testing on more than one occasion of at least four of the following control circuits:

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RANGE STATEMENT

- Multiple light switching circuit
- Master control circuit
- Single stop-start circuit
- Multiple stop-start circuit
- Time controlled circuit
- Machine interlocked circuit
- Motor jogging circuit
- Machine safety circuit

and,

using at least five of the following devices

- Multi-way switches
- Switches with more than two positions and Off
- Push buttons
- Electromechanical relays
- Programmable relays
- Contactors
- Reversing contactors
- Three phase starters
- Reduced voltage starters

and

with at least two of the following transducers/sensors:

- Timers
- Limit switches
- Proximity switches
- Photoelectric cells
- Pressure switches
- Float switches
- Light sensors
- Temperature sensors

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers determining correct operation of complex polyphase power circuits and providing solutions as they apply to electrical power engineering work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions.

Application of the Unit

Application of the Unit **4**)

This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit 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

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1.2) License to practice

contracts of training such as apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE125A	Provide engineering solutions for problems in complex multiple path circuits

and

UEENEEG102A	Solve problems in low voltage a.c. circuits

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a

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unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to provide engineering solutions to problems in complex polyphase power circuits.	1.1 OHS procedures for a given work area are identified, obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the circuit(s) problem 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 that may be required for the work are established in accordance with established procedures.
	1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Provide engineering solutions to problems in complex polyphase \ power circuits.	2.1 OHS risk control work measures and procedures are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Established methods are used for solving circuit problems from measure and calculated values as they apply to complex polyphase power circuits.
	2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.

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ELEMENT	PERFORMANCE CRITERIA	
	2.6	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document solutions for problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and providing solutions for problems in complex polyphase power circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG149A Polyphase power circuit analysis

Evidence shall show an understanding of polyphase power circuit analysis to an extent indicated by the following aspects:

T1 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:
- 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, VA and impedance to a common VA base.

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REQUIRED SKILLS AND KNOWLEDGE

T2 Types of three phase system connections encompassing:

- supply to balanced star, 3 and 4 wire loads
- supply to delta connected loads
- effects of phase reversal
- representation of currents and voltages as complex phasors for 3 phase and 3 phase and neutral quantities.
- calculation the values of and draw labeled 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 1 phase of a complex 3 phase system.
- represent unbalanced voltages or currents as symmetrical components.
- Phase to phase currents
- Phase to neutral/earth currents.

T3 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). Generators (high impedance earth)
- calculation of fault currents using the per unit approach.
- calculation using the “worst case” values based on transformer impedance only (ie., a short circuit fault)
- estimation of peak values using accepted multipliers.
- effects of the d.c. component on the instantaneous magnitudes of fault currents in transformers and generators.

T4 Unbalanced three phase loads encompassing:

- Star – 4 wire systems
- Delta systems
- Star – 3 wire systems
- Star 4 wire with neutral impedance

T5 Power in three-phase circuits encompassing:

- summation of phase powers and power in balanced loads
- measurement of power in balanced loads – 2 Wattmeter methods

T6 Reactive three phase power encompassing:

- power triangle calculation
- measurement of VAR

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REQUIRED SKILLS AND KNOWLEDGE

- power factor correction

T7 Fault currents encompassing:

- symmetrical components
- positive, negative and zero sequence impedance
- fault current breaking and let-through energy capacities of circuit breakers, 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 faults currents.

T8 Harmonics in three phase systems encompassing:

- presence of triple in harmonics in 3 phase systems
- effects of 3 phase harmonics for different star and delta connections.
- methods for reducing harmonics in three phase systems.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by

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EVIDENCE GUIDE

various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination

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legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in complex polyphase power circuits as described in 8) and including:

    A Determining the operating parameters of existing circuit.

    B Using established problem solving methods.

    C Taking relevant measurements accurately.

    D Interpreting measured values appropriately.

    E Providing effective solutions to circuit problems from measurements and calculations.

    F Giving written justification of solutions provided.

    G Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to providing engineering solutions for solving problems in complex polyphase power circuits.

Method of

9.4)

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assessment	This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'. Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.
Concurrent assessment and relationship with other units	**9.5**) There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to providing engineering solutions to complex polyphase power circuits as they apply to problems related to electrical power engineering diagnosis and development work functions in any of the following types of circuit problems:

- Determining the operating parameters of an existing complex circuit
- Altering an existing complex circuit to comply with specified operating parameters
- Developing complex circuits to comply with a specified function and operating parameters

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEG171A Install, set up and commission interval metering

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers the installation, set up and commission of interval metering for measurement of energy use by consumers under choice of supplier arrangement. It encompasses working safely and to installation and set up standards, evaluating the integrity of metering wiring and earthing systems, fixing metering, making power and communication connections, setting meter parameters and completing the necessary documentation.

Application of the Unit

Application of the Unit **4**)

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3 level or higher.

- license to practice in the workplace subject to regulations for undertaking of electrical work.

Practice in 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.

Note:
1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work

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Application of the Unit **4)**

environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.
2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit require a license to practice in the workplace subject to regulations for undertaking of electrical work. Practice in 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.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of electrotechnology components
UEENEEE104A	Solve problems in d.c circuits
UEENEEE105A	Fix and secure electrotechnology equipment

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Prerequisite Unit(s) **2)**

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 electrical apparatus and circuits
UEENEEG063A	Arrange circuits, control and protection for general electrical installations
UEENEEG101A	Solve problems in electromagnetic devices and related circuits
UEENEEG102A	Solve problems in low voltage a.c. circuit
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
UEENEEG104A	Install appliances, switchgear and associated accessories for low voltage electrical installations

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

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The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1 Prepare to install, set up and commission interval metering.	1.1	OHS procedures for a given work area are identified, obtained and understood.
	1.2	Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed.
	1.3	Safety hazards that have not previously been identified are noted and established risk control measures are implemented. (Note 1.)
	1.4	Switchboard on which the meter is to be installed is inspected and evaluated for compliance with safety and functionality standards. (Note 2)
	1.5	Approval to rectify safety and/or functionality defects of the switchboard is sought from person of higher authority in accordance with established procedures.
	1.6	Installation of the meter and rectification work is prepared in consultation with other effected by the work and sequenced appropriately. (Note 3)
	1.7	Material needed for the work is obtained in accordance with established procedures and checked against job requirements.

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ELEMENT	PERFORMANCE CRITERIA	
	1.8	Tools, equipment and testing devices needed to for the work are obtained in accordance with established procedures and checked for correct operation and safety.
2 Install, set up and commission interval metering.	2.1	OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Existing metering is checked as being isolated in strict accordance OHS requirements and procedures.
	2.4	Approved rectification work is carried out to comply with standards and in accordance with established procedures.
	2.5	Metering is installed to comply with technical standards and job specifications and requirements.
	2.6	Metering power and communication connections are made in accordance with manufacture's specifications and functional and regulatory requirements.
	2.7	Meter operating parameters are set in accordance with manufacture's specifications and functional and regulatory requirements.
	2.8	Unexpected situations are dealt with safely and with the approval of an authorised person
	2.9	Ongoing checks of the quality of installed apparatus are undertaken in accordance with established procedures.
	2.10	Metering installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.
3 Completion and report metering installation activities.	3.1	OHS work completion risk control measures and procedures are followed and supply is reinstated to the installation.
	3.2	Work site is cleaned and made safe in accordance with established procedures.

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ELEMENT	PERFORMANCE CRITERIA	
	3.3	Final checks are made to that the installed metering conforms to requirements.
	3.4	'As-installed' metering and rectification work is documented and appropriate persons notified in accordance with established procedures.

Note.
1. Examples of hazards likely to be encountered are asbestos reinforced switchboard panels, deteriorating switchgear and cabling and location of the switchboard.
2. Safety and functionality standards include the clear identification of switchboard components and their function, sound electrical insulation of wiring and components, sound MEN and main earth connections, fire integrity and access.
3. Preparation includes arranging for the safe isolation of the installation, access to a telecommunications connection where two-way metering is to be installed and access to a transducer connection where gas metering is to be included.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and installing, setting up and commissioning of interval metering.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EG171A Interval metering

Evidence shall show an understanding of interval metering to an extent indicated by the following aspects:

T1 Reasons for metering and the regulated market (Regulations)

T2 Metering layouts and requirements

- purpose, types and applications.
- metering equipment.
- varying arrangements for metering and meter layouts

T3 Interval metering concepts and installation

- Meter types
- Meter construction – block diagram
- Meter functions

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REQUIRED SKILLS AND KNOWLEDGE

- Importing and exporting energy
- Classes of meters
- Single and polyphase meters
- Purpose, types and applications.
- Installation and power connection arrangements.
- Communication methods and arrangements.
- Connections for gas metering.
- Procedures for setting meter parameters.

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. 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.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries

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risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.**2**)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of performance criteria demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Install and set up interval metering as described in 8) and including:

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A Inspecting and evaluating safety and functionality compliance of the switchboard accurately.

B Following established procedures to obtain approval to rectify non-compliance aspects of the switchboard.

C Carrying out preparation work effectively.

D Rectifying compliance defects.

E Placing and securing metering correctly.

F Making power and communications connections in accordance with manufacture's specifications and functional and regulatory requirements.

G Setting meter parameters in accordance with manufacture's specifications and functional and regulatory requirements.

H Reinstating supply to the installation safely.

I Documenting metering and rectification work and notifying appropriate persons in accordance with established procedures.

J Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry

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simulation policy.

The resources used for assessment should reflect current industry practices in relation to installing and setting up interval metering.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to the installation of at least:

- a single phase interval meter
- a two-way interval meter
- an interval meter where compliance rectification work is required

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	4	Writing	4	Numeracy	4

2.2) Literacy and numeracy skills

Competency Field **5)**

Electrical

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UEENEEH102A Repairs basic electronic apparatus faults by replacement of components

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit deals the replacement of electronic components, cabling and sub systems of electronic apparatus. It encompasses safe working practices, following written and oral instruction and procedures, basic testing and techniques, dismantling and assembling apparatus and disconnecting and reconnecting components.

Application of the Unit

Application of the Unit **2)**

This unit may apply to persons entering work in electro technology and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

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 voltage above 50 V a.c. or 120 V d.c. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:

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License to practice **3)**

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

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Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to repair electronic apparatus.	1.1	OHS procedures for a given work area are identified, obtained and understood through established routines and procedures.
		1.2	Established OHS risk control measures and procedures are followed in preparation for the work.
		1.3	The nature of the repair 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 co-ordinated effectively with others.
		1.5	Sources of materials that may be required for the work are established in accordance with established routines and procedures.
		1.6	Tools, apparatus and testing devices needed

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ELEMENT	PERFORMANCE CRITERIA	
		to carry out the work are obtained and checked for correct operation and safety.
2 Repair electronic apparatus.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits/apparatus are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Apparatus is dismantled in accordance with manufacturer's guide and supervisor's instructions.
	2.5	Component parts are tagged during the dismantling to help ensure correct and efficient reassembly and stored to protect them against loss or damage.
	2.6	Repairs are affected efficiently without damage to other components, apparatus or circuits.
	2.7	Apparatus is assembled in an appropriate sequence with all components parts placed, secured and connected in accordance with manufacturer's guide or industry practice.
	2.8	Procedures for referring non-routine events to immediate supervisor for directions are followed.
	2.9	Repairs are carried out efficiently without waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3 Complete and report repair work activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Repaired apparatus is prepared and forwarded to appropriate person(s) for

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ELEMENT	PERFORMANCE CRITERIA
	testing.
	3.3 Work area is cleaned and made safe in accordance with established procedures.
	3.4 Work supervisor is notified of the completion of the repair work in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and carrying out basic repairs to electronic apparatus by replacement of components.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH102A Component replacement to repair basic electronic apparatus faults

Evidence shall show an understanding of component replacement to repair basic electronic apparatus faults, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Electronic soldering equipment and techniques

- Workshop hazards and safety associated with soldering
- Quality concepts
- Electronic soldering equipment
- The soldering process
- Lead free solder

T2. Printed circuit board soldering techniques

- Electronic component mounting
- Solder rework of printed circuit boards.
- Faulty solder joints

T3. Soldering electronic cables

- Soldering multi-strand, ribbon and coaxial cables
- Effects and prevention of electrostatic discharge (ESD)

T4. Electronic component basics

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REQUIRED SKILLS AND KNOWLEDGE

- Types of components
- The physical features and primary characteristic of components
- Marking and codes on components
- Handling static sensitive components

T5. Electronic cable overview and coaxial cable

- Coaxial cables types and characteristics
- Coaxial cable termination

T6. Performance copper cables

- Twisted pair voice and data cables
- Insulation displacement (IDC) termination
- Colour codes
- Terminating performance cables
- Harness wiring

T7. Electronic apparatus components

- Fault finding
- Testing
- Replacement

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment	**9.1)**
	Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must

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include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:

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- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Carry out basic repairs to electronic apparatus by replacement of components as described in 8) and including:

A Following manufacturer service instructions for access to components.

B Removing at least three different types of components specified in the work instructions.

C Replacing components to manufacturer requirements.

D Terminating correctly electronic cables using solderless termination techniques

E De-soldering and soldering to a high reliability standard and without damage to components.

F Reassembling the apparatus correctly.

G Testing apparatus operation.

H Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

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.

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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note: Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to carrying out basic repairs to electronic apparatus by replacement of components.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note: Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

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UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to carrying out basic repairs electronic apparatus limited to replacement or repair of components, including sub systems in which the fault has been previously established.

At least two of the repairs shall require soldering and desoldering and at least two of the repairs shall require a cable to be correctly terminated using a solderless termination technique.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electronics

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UEENEEH112A Troubleshoot digital sub-systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers determining correct operation of digital sub-systems. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in digital components circuits.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended for development of competency in either entry-level employment based programs incorporated in approved contracts of training or other approved training programs. It may also be used to augment formally acquired competencies.

This unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 3 or higher.

Licensing/Regulatory Information

License to practice **3)**

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 voltage above 50 V a.c. or 120 V d.c. However other

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License to practice **3)**

conditions may apply in some States/Territories 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.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace
UEENEEH102A	Repair basic electronic apparatus faults by replacement of components

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in

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this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to troubleshoot digital sub-systems.	1.1 OHS procedures for a given work area are obtained and understood.
	1.2 OHS risk control work preparation measures and procedures are followed.
	1.3 The nature of the fault 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

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ELEMENT		PERFORMANCE CRITERIA	
			ensure the work is co-ordinated 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 carry out the work are obtained and checked for correct operation and safety.
2	Troubleshoot digital sub-systems.	2.1	OHS risk control work measures and procedures are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Fault finding is approached methodically drawing on knowledge of digital components using measured and calculated values of parameters.
		2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
		2.6	Fault finding activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.
3	Complete work and document troubleshooting activities.	3.1	OHS work completion risk control measures and procedures are followed.
		3.2	Work site is cleaned and made safe in accordance with established procedures.
		3.3	Justification for solutions used to troubleshooting problems is documented.
		3.4	Work completion is documented and an appropriate person or persons notified in

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ELEMENT **PERFORMANCE CRITERIA**

accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and troubleshooting digital subsystems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH112A **Digital sub-system**

Evidence shall show an understanding of digital sub-system troubleshooting, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. Analogue and digital signals

- Comparison between analogue and digital signals
- Observing digital and analogue waveforms

T2. Numbering systems

- The binary number system
- The hexadecimal number system
- Binary addition and subtraction

T3. Numbering systems - conversions

- Conversion between numbering systems
- Binary Coded Decimal (BCD)
- Gray code
- The American Standard Code for Information Interchange (ASCII)
- Unicode

T4. Combinational logic circuits

- Precautions when handling electronic devices due to electrostatic discharge (ESD)
- Truth tables
- Basic operation and characteristics of logic gates
- Logic probes
- Verification of operation of logic circuits

T5. Digital displays

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REQUIRED SKILLS AND KNOWLEDGE

- Seven segment LED displays
- Drive requirements
- Current limiting
- Multiplexed displays
- Seven segment Decoders
- Liquid Crystal Displays (LCD)
- Emerging display technologies
- Verification of seven segment display circuit
- Interfacing with logic circuits

T6. Digital subsystem building blocks

- Encoders and Decoders
- Multiplexers and Demultiplexers
- Timing diagrams
- Flip flops, Latches and registers
- Ripple counters
- MOD counters
- Synchronous counters Multi-vibrators
- Clocks
- Verification and operation (eg. PLDs, ICs)

T7. Digital fault finding

- General fault finding principles
- Common digital faults
- Digital test equipment
- Digital test equipment (eg. Logic probes, Digital Oscilloscopes, digital trainers)

T8. Logic families and specifications

- Input and output voltage characteristics
- Comparison of logic families
- Unit load
- Noise margin
- Interfacing different logic families
- Tri-state logic devices

Overview and applications of A/D converter and D/A converter

Evidence Guide

EVIDENCE GUIDE

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EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. . It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Troubleshoot digital subsystems as described in 8) and including:

A	Using methodical problem solving methods.
B	Taking measurements correctly and accurately.
C	Calculating parameters correctly and accurately.
D	Providing solution to digital component/circuit problems.

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E	Providing written justification for the solutions to problems.
F	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed item

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 vendor training with performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 ‘Assessment Guidelines’.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment

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and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

The resources used for assessment should reflect current industry practices in relation to troubleshooting digital subsystems.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEH 102A	Repair basic electronic apparatus faults by replacement of components
UEENEEH 116A	Find and repair microwave amplifier section faults of electronic apparatus
UEENEEH 139A	Troubleshoot basic amplifier circuits

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to troubleshooting a digital subsystem with at least three types of basic digital components/circuits or functions.

The troubleshooting must be demonstrated on three types of faults.

Notes:

1. The range of faults may include: open/shorted signal lines, output loading, input-to-input connections and clock-related faults.

2. Troubleshooting may involve the alteration of an existing digital subsystem to

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RANGE STATEMENT

comply with a specified function and operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Electronics

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UEENEEH139A Troubleshoot basic amplifier circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers determining correct operation of basic amplifier circuits. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in basic amplifier circuits.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended for development of competency in either entry-level employment based programs incorporated in approved contracts of training or other approved training programs. It may also be used to augment formally acquired competencies.

This unit is intended as an additional competency to relevant competencies previously acquired. It is suitable for employment-based programs under an approved contract of training at the aligned AQF 3 level or higher.

Licensing/Regulatory Information

License to practice **3)**

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

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License to practice **3)**

voltage above 50 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories 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.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEH102A	Repair basic electronic apparatus faults by replacement of components

AND

UEENEEH114A	Troubleshoot resonance circuits in an electronic apparatus

OR

UEENEEG1	Solve problems in low voltage a.c. circuits

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Prerequisite Unit(s) **4)**

02A

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to troubleshoot basic	1.1 OHS procedures for a given work area are

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ELEMENT	PERFORMANCE CRITERIA	
amplifiers.		obtained and understood.
	1.2	OHS risk control work preparation measures and procedures are followed.
	1.3	The nature of the fault 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 co-ordinated 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 carry out the work are obtained and checked for correct operation and safety.
2 Solve basic amplifier circuit problems.	2.1	OHS risk control work measures and procedures are followed.
	2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4	Fault finding is approached methodically drawing on knowledge of basic amplifiers using measured and calculated values of parameters.
	2.5	Unexpected situations are dealt with safely and with the approval of an authorised person.
	2.6	Fault finding activities are carried out efficiently without unnecessary waste of materials or damage to apparatus and the surrounding environment or services and using sustainable energy practices.

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ELEMENT	PERFORMANCE CRITERIA
3 Complete work and document problem solving activities.	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with established procedures.
	3.3 Justification for solutions used to troubleshooting problems is documented.
	3.4 Work completion is documented and an appropriate person or persons notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and troubleshooting basic amplifiers.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EH139A Basic amplifier circuit troubleshooting

Evidence shall show an understanding of basic amplifier circuit troubleshooting, applying safe working practices and relevant Standards Codes and Regulations to an extent indicated by the following aspects:

T1. Introduction to Amplifiers

- Purpose of amplifiers
- Introduction to black box model of amplifier
- Decibels, engineering terms and formulae
- Measurement of gain and frequency response

T2. Amplifier Terminal Characteristics

- Amplifier types and transfer characteristics
- Ideal amplifier transfer characteristics

T3. Practical amplifiers

- Practical amplifier terminal characteristics
- Input and output resistance calculations based on voltage measurements

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REQUIRED SKILLS AND KNOWLEDGE

T4. Operational amplifiers - Introduction

- Advantages of operational amplifiers
- Schematic symbol
- Open loop configuration
- Input and output resistance
- Gain bandwidth product
- Open loop amplifier operation
- Comparator circuit
- Circuit verification of operational amplifier configured as a comparator

T5. Operational amplifiers – Inverting Amplifier

- The need for and effects of negative feedback
- Inverting operational amplifier circuit configuration
- Inverting operational amplifier gain calculations
- Summing inverting operational amplifier gain calculations
- Circuit verification of operational amplifier gain

T6. Operational amplifiers – Non-inverting amplifier

- Non-inverting operational amplifier circuit configuration
- Non-inverting operational amplifier gain calculations
- Circuit verification of non inverting operational amplifier gain
- Voltage follower circuit configuration
- Voltage follower circuit gain
- Circuit verification of voltage follower

T7. Operational amplifiers – Differential Amplifier

- The differential amplifier
- Schematic circuit of differential amplifier using an operational amplifier
- Differential amplifier gain calculations
- Circuit verification of differential amplifier operation
- The Schmitt trigger
- Circuit verification of Schmitt trigger circuit

Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package. .

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EVIDENCE GUIDE

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it must include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to **9.2)**

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demonstrate competency in this unit

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Troubleshoot basic amplifiers as described in 8) and including:

A Using methodical problem solving methods.

B Taking measurements correctly and accurately.

C Calculating parameters correctly and accurately.

D Providing solution to amplifier circuit problems.

E Providing written justification for the solutions to problems.

F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions

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incorporated in a holistic assessment with the above listed items.

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.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to troubleshooting basic amplifiers.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential

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knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to troubleshooting amplifiers for at least three types of amplifier configurations.

The troubleshooting must be demonstrated on three types of faults.

Note:

1. The range of faults may include: distortion, excessive power consumption, low gain and limited frequency responses.

2. Troubleshooting may involve the modification of an existing amplifier configuration to comply with a specified function and operating parameters.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

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Competency Field

Competency Field **11)**

Electronics

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UEENEEI155A Develop structured programs to control external devices

Modification History

		UEENEEI155A	Develop structured programs to control external devices	
Release	Action	Core/Elective	Details	Points
2	Editorial	N/A	In Pre-requisites, delete “For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2”.	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace “essential knowledge and associated skills” with “required skills and knowledge”.	

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This competency standard unit covers programming of microprocessor/microcontroller devices to access external devices. The unit encompasses working safely, applying knowledge of control applications, and analogue and digital input/output signals, programming fundamentals, writing and testing program and documenting programming activities.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended to apply to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

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Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	5	Writing	5	Numeracy	5

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Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to develop structured programs for control sub systems.	1.1	OHS processes and procedures for a given work area are obtained and understood.
		1.2	Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3	The extent of structure programming to be developed is determined from job performance specifications and in consultations with relevant persons.
		1.4	Activities are planned to meet scheduled timelines in consultation with others involved on the work.
		1.5	Appropriate development kit and software are selected based on specified requirements and performance standard.
		1.6	Strategies are implemented to ensure programming is carried out efficiently.

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ELEMENT	PERFORMANCE CRITERIA
2 Develop structured programs for control sub systems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of computer functions and features are applied to developing structure program.
	2.3 Correct structure and syntax is applied to developing structure program.
	2.4 Key features of the programming language are applied to develop and test solutions. (Note)
	2.5 Approaches to issues/problems are analysed to provide most effective solutions.
	2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards
3 Test and document structured program for control subsystems.	3.1 Testing procedures are developed to test developed program.
	3.2 Problems and bugs in program are rectified to ensure specification the creation of the code is met.
	3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person or persons.
	Note: Although programming in ‘C’ is preferred any other structured language in current use by industry may be used.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this

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REQUIRED SKILLS AND KNOWLEDGE

unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing structured programs to control external devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EI155A Control programming fundamentals

Evidence shall show an understanding of control programming fundamentals to an extent indicated by the following aspects:

T1. Control applications of software

T2. Software terminology

T3. Programming languages currently used by industry

T4. Program development - flowcharts, pseudocode, algorithms

T5. Programming concepts encompassing:

- programming structure
- documentation
- compiling source code
- generating executable files
- scalar and structured data types
- constants and variables
- reading from keyboard and writing to screen
- arithmetic, relational and logical operations
- making decisions
- looping operations
- programming to access external devices via 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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the

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EVIDENCE GUIDE

unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment 9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects 9.2)

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of evidence required to demonstrate competency in this unit

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UEE11". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the required knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements; and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - developing structured programs to control external devices as described in 8) and including:

A Using key features of an appropriate programming language.

B Developing testing procedures.

C Identifying problem and bugs in program.

D Rectifying problem and bugs in program.

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E	Writing and presenting relevant documentation to an acceptable standard.
F	Dealing with unplanned events by drawing on required knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

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.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing structured programs to control external devices.

Method of assessment **9.4)**

This competency standard unit shall be assessed by methods given

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in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the required knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to developing structured programs to control external devices for a given representative range of programs and control devices with the following attributes:

- safe working practices
- control applications knowledge application
- analogue and digital input/output signals
- programming
- program writing and testing
- programming activities documentation

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Instrumentation and Control

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UEENEEI156A Develop and test code for microcontroller devices

Modification History

		UEENEEI156A	Develop and test code for microcontroller devices	
Release	Action	Core/Elective	Details	Points
2	Editorial	N/A	In Pre-requisites, delete “For the full prerequisite chain details for this unit please refer to Table 2 in Volume 1, Part 2”.	
2	Editorial	N/A	In Required Skills and Knowledge, insert topic numbering.	
2	Editorial	N/A	Replace “essential knowledge and associated skills” with “required skills and knowledge”.	

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This competency standard unit covers structured programming instructions for micro devices at a fundamental level. The unit encompasses working safely, applying knowledge device architecture and programming fundamentals, writing and testing specified instructions and documenting development activities.

Note.

In this unit the term ‘micro’ refers to microcontrollers however competency in the unit can be achieved using microprocessors.

Application of the Unit

Application of the Unit **2)**

This competency standard unit is intended to apply to any recognised development program that leads to the

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acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships and the like.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Unit Code	Unit Title
UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading	5	Writing	5	Numeracy	5

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Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA
1	Prepare to develop and test basic specifications.	1.1 OHS processes and procedures for a given work area are obtained and understood.
		1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
		1.3 The extent of specifications to be developed is determined from job performance requirements and in consultations with relevant persons.
		1.4 Activities are planned to meet scheduled timelines in consultation with others involved on the work.
		1.5 Appropriate development kit and software are selected based on specified requirements and performance standard.
		1.6 Strategies are implemented to ensure programming is carried out efficiently.

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ELEMENT	PERFORMANCE CRITERIA
2 Develop basic specification.	2.1 OHS risk control measures and procedures for carrying out the work are followed.
	2.2 Knowledge of micro controller functions and features are applied to developing specifications.
	2.3 Correct structure and syntax is applied to developing program specification for target micro controller function.
	2.4 Key features of the assembler programming language are applied to develop and test solutions.
	2.5 Approaches to issues/problems are analysed to provide most effective solutions.
	2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.
3 Test and document the basic specification.	3.1 Testing procedures are developed to analyse code developed.
	3.2 Problems and bugs are rectified to ensure specification the creation of the code is met.
	3.3 Intermediate and final work reports are written in accordance with professional standards and presented to appropriate person or persons.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the required skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and developing and testing code for microcontroller devices.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

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REQUIRED SKILLS AND KNOWLEDGE

KS01-EI156A Microcontroller programming

Evidence shall show an understanding of microcontroller control system programming methods to an extent indicated by the following aspects:

T1 Microcontroller architecture encompassing:

- Program storage types
- Data storage types
- I/O Ports: analogue/ digital
- Integrated Peripherals: timers, interrupts etc
- Control circuitry: system clock, reset etc

T2. Programmer's model encompassing:

- Industry standard programming environment

T3. Programming terms encompassing:

- Language levels and their features
- Language simulators and emulators

T4. Language programming basics encompassing:

- Programming input/output functions
- Input/output port programming
- Structured assembly programming
- Timing loops

T5. Memory organisation, operation and addressing methods encompassing:

- register structure
- instruction register/decoder
- arithmetic logic unit (ALU)
- accumulator and flags
- instruction cycle timing
- control lines
- stack pointer
- index register

T6. System clock circuits fetch and execute encompassing:

- timing cycle
- timing relationship to system clock
- logic levels of system buses for each clock period of an instruction cycle

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Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the "Assessment Guidelines – UEE11". Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable energy principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the required knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.; and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Develop and test code for microcontroller devices as described in 8) and including:

A Using all key features of an appropriate assembler language.

B Developing testing procedures.

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C	Identifying problem and bugs in program.
D	Rectifying problem and bugs in program.
E	Writing and presenting work reports to an acceptable standard.
F	Dealing with unplanned events by drawing on required knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to developing and testing code for microcontroller devices.

Method of assessment

9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

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Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified required knowledge and skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to developing and testing code for microcontroller devices including at least three of the following:

- Selecting an appropriate micro for a given task
- Setting up and using basic input/output functions
- Using assembler/simulator software packages to debug program
- Finding system faults.

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

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Competency Field

Competency Field **11)**

Instrumentation and Control

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UEENEEK101A Maintain safety and tidiness of remote area power supply systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers maintaining safety of remote area power supply (RAPS) system by ensuring that only RAPS equipment is present and is in its allotted place and that the system is free of litter. It encompasses working safely, regularly checking systems, cleaning techniques and reporting safety issues.

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace
UEENEEK102A	Work safely with remote area power supply systems

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading	3	Writing	3	Numeracy	3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a	Performance Criteria describe the required performance needed to demonstrate achievement of the element.

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competency standard unit	Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to maintain safety and tidiness of RAPS system	1.1 OHS procedures for a given work area are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature and location of the RAPS system is obtained from work schedule and supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community.
	1.6 Tools and equipment needed to carry out the cleaning work are obtained and checked for correct operation and safety
2 Maintain safety and tidiness of RAPS system	2.1 Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
	2.3 Circuits/machines/system are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
	2.4 Routine procedures are used to clean RAPS system and area.

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ELEMENT	PERFORMANCE CRITERIA	
	2.5	Cleaning is carried out efficiently without waste of materials and energy or damage to apparatus, circuits, the surrounding environment or services.
	2.6	Routine quality checks are carried out in accordance with work instructions.
3 Complete work and report	3.1	OHS risk control work completion measures and procedures are followed.
	3.2	Procedures for referring cleaning and tidiness issues to the local community are followed.
	3.3	Completion of cleaning work and issues are reported to work supervisor in accordance with established routines.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining safety and tidiness of remote area power supply (RAPS) systems

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK101A RAPS plant area cleaning

Evidence shall show an understanding of cleaning and maintaining remote area power supply (RAPS) systems to an extent indicated by the following aspects:

- Needs 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
  - acid spills;

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REQUIRED SKILLS AND KNOWLEDGE

- removal of dust, insects, spiders, animals
- removal of non-RAPS equipment
- Technique for reporting and dealing with cleaning issues.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to

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minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

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- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Maintain safety and tidiness of remote area power supply systems as described in 8) and including:

A	Removing non-RAPS equipment
B	Safely removing insects, spiders and any animals
C	Safely removing dust and dirt from floors and equipment
D	Identifying and reporting at least two safety issues
E	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to maintaining safety and tidiness of remote area power supply systems.

Method of

9.4)

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assessment

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5) There are no concurrent assessment recommendations for this unit.

For optimisation of training and assessment effort, competence in this unit may be assessed concurrently with units UEENEEE101A Apply Occupational Health Safety regulations, codes and practices in the workplace

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems incorporating a battery bank and at least two of the following:

- Generator set
- Photo voltaic array
- RAP system
- Wind generator

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK102A Work safely with remote area power supply systems

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers safety practices for working on remote area power supply (RAPS) systems. It encompasses identifying safety hazards, using risks control measures and following routine procedures for prescribed system maintenance.

Note:
Components of this unit are included in the critical aspects of evidence in each applicable unit to ensure that OHS practices are demonstrated as they apply to RAPS system servicing work functions and situations

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However,

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License to practice **3)**

practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to enter a RAPS system	1.1	Instruction in hazards and risk control measures for RAPS systems maintenance are identified, obtained and understood.
		1.2	System access permit is obtained from work supervisor.
		1.3.	Preparations for electrical and non-electrical isolation are made to prevent creation of hazards
		1.4	Tools and equipment needed for the work are checked for safety and correct functionality according to established safety routines.
2	Apply safe working practices in RAPS system area.	2.1	Workplace procedures and work instructions for controlling risk are followed accurately.
		2.2	Workplace procedures for dealing safe working practices in RAPS system are followed according to prescribed work procedures.
		2.3	Circuits/machines/system are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Routine procedures are used to apply safe working practices in RAPS system and area.
		2.5	Safe working practices are carried out efficiently without waste of materials and energy or damage to apparatus, circuits, the surrounding environment or services.
		2.6	Routine quality checks are carried out in accordance with work instructions.
3.	Follow workplace procedures for hazard identification and risk control in RAPS system areas	3.1	Hazards are identified and prescribed control measures implemented and monitored through active participation in the consultation process with employer, other employees and local community.

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ELEMENT	PERFORMANCE CRITERIA
	3.2 Hazards in the work are recognised and reported to work supervisor personnel according to established procedures.
	3.3 OHS records of incidents are completed in accordance with regulatory requirements and established procedures
	3.4 Workplace instructions and training are followed accurately within established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and working safely with remote area power supply (RAPS) systems.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK102A Remote area power supply safe working practice

Evidence shall show an understanding of RAPS safe working practices to an extent indicated by the following aspects:

General safety encompassing:

- General safety
- Risk assessment
- Personal protective equipment
- OHS procedures

RAPS safety and risk assessment encompassing:

- Types of hazards in and around remote area power supplies

Note: In addition to the safety hazards found in most workplace RAPS systems are likely to have the hazards related to electricity supplied from more than one source, rotating machines, fuels and oils, exhaust fumes, and acids and flammable gases from batteries.

- Measures for dealing with hazards in and around remote area power supplies

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REQUIRED SKILLS AND KNOWLEDGE

- 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 photo voltaic 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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships.

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However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function

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and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
- Apply sustainable energy principles and practices as specified in the performance criteria and range statement
- Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Work safely with remote area power supply (RAPS) systems as described in 8) and including:

A Preparing to enter the RAPS system including, permission to enter the area and to isolate RAPS equipment

B Applying work procedures and instructions as they apply to risk control measures

C Dealing with accidents and emergencies

D Participating in consultation processes, identifying hazards and implementing and monitoring control measures

E Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice

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using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to working safely with remote area power supply (RAPS) systems.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competence development in this unit may be arranged concurrently with other units in a qualification or possible skill clusters in which this unit is included.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational

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health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems incorporating a battery bank, a generator set and a photo voltaic array and at least one similar RAPS system with the additions of a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK103A Conduct periodic maintenance of remote area power supply battery banks

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) battery banks where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of battery faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEK102A	Work safely with remote area power supply systems
UEENEEE131A	Solve problems in ELV circuits for non electrical workers

OR

UEENEEE104A	Solve problems in d.c. circuits

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

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Employability Skills Information

Employability Skills	**5)**
	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to conduct periodic maintenance of battery banks	1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
	1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with

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ELEMENT	PERFORMANCE CRITERIA	
		fellow workers and the local community
	1.6	Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Maintain RAPS systems battery banks.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures
	2.4	Prescribed maintenance procedures are used to test and check RAPS system battery banks
	2.5	Battery bank maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures
	2.6	Known types of battery functional faults are identified using routine fault finding procedures
	2.7	Procedures are followed for referring non-routine events to immediate supervisor for directions
	2.8	Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
	2.9	Routine quality checks are carried out in accordance with work instructions
3 Complete	3.1	OHS work completion risk control measures and

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ELEMENT	PERFORMANCE CRITERIA	
maintenance work on battery banks and report.		procedures are followed
	3.2	Work site is cleaned and made safe in accordance with routine procedures
	3.3	Procedures for referring local maintenance issues to the community are followed
	3.4	Battery bank performance measurements are reported to the work supervisor through the established maintenance reporting procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) battery banks.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK103A RAPS systems battery bank maintenance techniques

Evidence shall show an understanding of maintaining RAPS battery systems to an extent indicated by the following aspects:

T1 Basic battery maintenance encompassing:

- 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

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Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

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Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) battery banks as described in 8) and including:

A Measuring and recording specific gravity of electrolyte

B Measuring and recording cell voltages

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C	Visual inspecting of batteries for low electrolyte levels; electrolyte leakage corroded terminals and connections
D	Topping up low electrolyte levels
E	Identifying electrolyte leaks
F	Cleaning corroded terminals and connections and treating with an anticorrosive
G	Reporting all maintenance activities
H	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

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 must be clearly identified.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote

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area power supply (RAPS) battery banks.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK104A	Conduct periodic maintenance of remote area power supply generator sets
UEENEEK105A	Conduct periodic maintenance of remote area power supply photo voltaic arrays
UEENEEK106A	Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and

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RANGE STATEMENT

situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the battery bank is charged from a generator set and a photo voltaic array and at least one similar RAPS system where the battery bank is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK104A Conduct periodic maintenance of remote area power supply generator sets

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit		Show full pre-req chain in the unit	

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) generator sets where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of generator faults using routine procedures and completing the necessary maintenance reporting

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not

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License to practice **3)**

require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEK102A	Work safely with remote area power supply systems
UEENEEE131A	Solve problems in ELV circuits for non electrical workers

OR

UEENEEE104A	Solve problems in d.c. circuits

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in

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this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to conduct periodic maintenance on generator sets	1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor

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ELEMENT	PERFORMANCE CRITERIA	
	1.4	The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken
	1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
	1.6	Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Maintain RAPS systems generator sets	2.1	Established OHS risk control measures and procedures for carrying out the work are followed
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures
	2.4	Prescribed maintenance procedures are used to test and check RAPS system generator sets
	2.5	Generator set maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures
	2.6	Known types of generator set functional faults are identified using routine fault finding procedures
	2.7	Procedures are followed for referring non-routine events to immediate supervisor for directions
	2.8	Maintenance and repair work is carried out

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ELEMENT	PERFORMANCE CRITERIA	
		efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
	2.9	Routine quality checks are carried out in accordance with work instructions.
3 Complete maintenance work of generator sets and report	3.1	OHS work completion risk control measures and procedures are followed
	3.2	Work site is cleaned and made safe in accordance with routine procedures
	3.3	Procedures for referring local maintenance issues to the community are followed
	3.4	Generator set performance measurements are reported to the work supervisor through the established maintenance reporting procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) generator sets.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK104A RAPS system generator sets maintenance techniques

Evidence shall show an understanding of maintaining remote area power supply generator sets to an extent indicated by the following aspects:

T1 Basic generator set maintenance encompassing:

- Checking of radiator and oil level;
- Periodic oil change
- Periodic air, oil and fuel filter change.
- Maintaining log books for maintenance regime

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Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the

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assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) generator sets as described in 8) and including:

A Measuring and recording generator no-load and

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	load voltages
B	Measuring and recording generator output for three load conditions
C	Checking drive engine coolant and oil level
D	Visually inspecting drive engine for coolant and oil leaks
E	Checking condition of drive engine oil, oil filter and air filter
F	Identifying need to change drive engine oil, oil filter and air filter
G	Changing drive engine oil, oil filter and air filter
H	Topping up low coolant and oil levels
I	Identifying the cause of any coolant and oil leaks
J	Reporting all maintenance activities
K	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and

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replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote area power supply (RAPS) generator sets.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK103A	Conduct periodic maintenance of remote area power supply battery banks
UEENEEK105A	Conduct periodic maintenance of remote area power supply photo voltaic arrays
UEENEEK106A	Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

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Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the generator set is charged from a generator set and a photo voltaic array and at least one similar RAPS system where the generator set is charged form a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK105A Conduct periodic maintenance of remote area power supply photo voltaic arrays

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) photo voltaic arrays where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of photo voltaic array faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEK102A	Work safely with remote area power supply systems
UEENEEE131A	Solve problems in ELV circuits for non electrical workers

OR

UEENEEE104A	Solve problems in d.c. circuits

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

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Employability Skills Information

Employability Skills	**5)**
	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to conduct periodic maintenance on photo voltaic arrays	1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures.
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with

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ELEMENT	PERFORMANCE CRITERIA	
		fellow workers and the local community.
	1.6	Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2 Maintain RAPS systems photo voltaic arrays	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures.
	2.4	Prescribed maintenance procedures are used to test and check RAPS system photo voltaic arrays.
	2.5	Photo voltaic array maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures.
	2.6	Known types of photo voltaic array functional faults are identified using routine fault finding procedures.
	2.7	Procedures are followed for referring non-routine events to immediate supervisor for directions.
	2.8	Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
	2.9	Routine quality checks are carried out in accordance with work instructions.

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ELEMENT	PERFORMANCE CRITERIA	
3 Complete maintenance work of photo voltaic arrays and report	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with routine procedures.
	3.3	Procedures for referring local maintenance issues to the community are followed.
	3.4	Photo voltaic array performance measurements are reported to the work supervisor through the established maintenance reporting procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) photo voltaic arrays sets.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK105A RAPS systems photovoltaic array maintenance techniques

Evidence shall show an understanding of maintaining remote area power supply (RAPS) photovoltaic arrays to an extent indicated by the following aspects:

T1 RAPS systems photovoltaic array maintenance techniques encompassing:

- Cleaning of photo voltaic modules
- Checking for damage or de-lamination
- Checking of module connections, connecting cable and integrity of the array structure
- Maintaining log books and maintenance regime

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Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment

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Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices & workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) photo voltaic arrays as described in 8) and including:

A Measuring and recording array no-load and load voltages together with ambient temperature

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B	Measuring and recording array output for three load conditions
C	Visually inspecting array modules and support structure for physical damage
D	Visually inspecting array connections and cables
E	Identifying array defects and faults
F	Reporting all maintenance activities
G	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote area power supply (RAPS) photo voltaic arrays.

Method of assessment

9.4)

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This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK103A	Conduct periodic maintenance of remote area power supply battery banks
UEENEEK104A	Conduct periodic maintenance of remote area power supply generator sets
UEENEEK106A	Conduct periodic maintenance of remote area power supply wind generators

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to least two different RAPS systems in which the photo voltaic array is charged from a photo voltaic array and a photo voltaic array and at least one similar RAPS system where the photo voltaic array is charged form a wind generator.

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RANGE STATEMENT

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK106A Conduct periodic maintenance of remote area power supply wind generators

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers maintenance of remote area power supply (RAPS) wind generators where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of wind generator faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health Safety regulations, codes and practices in the workplace
UEENEEE102A	Fabricate, dismantle, assemble of utilities industry components
UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEK102A	Work safely with remote area power supply systems
UEENEEE131A	Solve problems in ELV circuits for non electrical workers

OR

UEENEEE104A	Solve problems in d.c. circuits

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

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Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to conduct periodic maintenance on wind generators	1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor.
	1.4 The nature and location of RAPS system is identified from documentation or from work supervisor to establish the scope of work to be undertaken.
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with

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ELEMENT	PERFORMANCE CRITERIA	
		fellow workers and the local community.
	1.6	Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures.
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Maintain RAPS systems wind generators	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.
	2.2	The need to test or measure live is determined in strict accordance with 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 OHS requirements and procedures
	2.4	Prescribed maintenance procedures are used to test and check RAPS system wind generators
	2.5	Wind generator maintenance, including performance measurements and repairs, are carried out safely and to prescribed routines and procedures.
	2.6	Known types of wind generator functional faults are identified using routine fault finding procedures.
	2.7	Procedures are followed for referring non-routine events to immediate supervisor for directions.
	2.8	Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
	2.9	Routine quality checks are carried out in accordance with work instructions.

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ELEMENT	PERFORMANCE CRITERIA
3 Complete maintenance work of wind generators and report	3.1 OHS work completion risk control measures and procedures are followed.
	3.2 Work site is cleaned and made safe in accordance with routine procedures.
	3.3 Procedures for referring local maintenance issues to the community are followed.
	3.4 Wind generator performance measurements are reported to the work supervisor through the established maintenance reporting procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and conducting periodic maintenance of remote area power supply (RAPS) wind generators.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK106A RAPS systems wind generator maintenance techniques

Evidence shall show an understanding of maintaining small wind generator systems to an extent indicated by the following aspects:

T1 Wind generator minor maintenance encompassing:

- Checking the integrity of support structure
- Tension of stay wires
- Visual inspection of wind generator operation
- Maintaining log books and maintenance regime

Evidence Guide

EVIDENCE GUIDE

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EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

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Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Conduct periodic maintenance of remote area power supply (RAPS) wind generators as described in 8) and including:

A Measuring and recording generator no-load and load voltages;

B Measuring and recording generator output for three load conditions;

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C	Visually inspecting generator and support structure for physical damage;
D	Visually inspecting generator connections and cables;
E	Identifying generator defects and faults;
F	Reporting all maintenance activities
G	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting periodic maintenance of remote area power supply (RAPS) wind generators.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3

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'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

UEENEEK103A	Conduct periodic maintenance of remote area power supply battery banks
UEENEEK104A	Conduct periodic maintenance of remote area power supply generator sets
UEENEEK105A	Conduct periodic maintenance of remote area power supply photo voltaic arrays

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to at least two different RAPS systems in which the battery bank is charged from a generator set and a wind generator.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK116A Maintain and repair remote area power generation facilities

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit		Show full pre-req chain in the unit	

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers basic maintenance of power generation facilities in remote areas It encompasses working safely, following maintenance schedules to inspect, repair, replace and adjustment equipment, maintaining a clean and efficient generation facility and completing the necessary reporting.

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in remote area utilities facilities servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general and be used in school-based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However,

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License to practice **3)**

practice in this unit is subject to regulations directly related to occupational health and safety and contracts of training such as new apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, 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.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

Where pre-requisite 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):

Electrotechnology

Remote Area

Common Unit Group

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

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Prerequisite Unit(s) **4)**

UEENEEE102A	Fabricate, assemble and dismantle utilities industry components
UEENEEE107A	Use drawings, diagrams, schedules, standards, codes and specifications
UEENEEK101A	Maintain safety and tidiness of remote area power supply systems
UEENEEK102A	Work safely with remote area power supply systems
UEENEEK104A	Conduct periodic maintenance of remote area power supply generator sets

Electrotechnology Pathway Group

UEENEEE104A	Solve problems in d.c. Circuits

Remote Area Pathway Group

UEENEEE131A	Solve problems in ELV circuits for non electrical workers

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the

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Employability Skills	**5)** qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Prepare to maintain and repair remote area power generation facilities	1.1 OHS procedures for a remote area power station facility are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
	1.4 The nature and location of remote area power station facility is obtained from documentation or from work supervisor to establish the scope of work to be undertaken
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
	1.6 Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for

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ELEMENT	PERFORMANCE CRITERIA	
		correct operation and safety.
2 Maintain and repair remote area power generation facilities	2.1	Established OHS risk control measures and procedures for carrying out the work are followed
	2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.2	Inspection, repairs, replacements and/or adjustments are carried out on items listed in the maintenance schedule and in accordance with established procedures.
	2.3	Fuel, coolant, oil and other fluid spills are cleaned and area made safe in accordance with established procedures.
	2.4	Batteries are serviced and/or replaced as specified in the maintenance schedule and in accordance with established procedures.
	2.5	Consumables are removed and disposed of following environmentally safe procedures.
	2.6	Procedures are followed for referring non-routine events to immediate supervisor for directions
	2.7	Routine quality checks are carried out in accordance with work instructions
3 Report maintenance and repair of remote area power generation facilities	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority.
	3.3	Work carried out is reported to the work supervisor through the established maintenance reporting procedures.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining and repairing facilities associated with remote area essential service operations.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK116A Remote area essential services power plant

Evidence shall show an understanding of remote area essential services power plant to an extend indicated by the following aspects:

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 include engine oil, oil filters, fuel filters, engine coolant system filters, air cleaners and fan belts;
  - Inspection and repair items include 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, switchboard (nicad) batteries)
- Battery maintenance techniques

Schedule regular servicing and maintenance encompassing:

- Engine oil and filter changes;
- Fuel filters;
- Coolant filters

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REQUIRED SKILLS AND KNOWLEDGE

- 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)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous

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substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites must be met.

Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement.
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment

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- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Maintain and repair remote area power generation facilities as described in 8) and including:

A Understanding the location and nature of the work required

B Correctly inspecting, repairing, replacing and adjusting items listed in the maintenance schedule

C Cleaning fluid spills appropriately.

D Removing and disposing of consumable following environmentally safe procedures.

E Documenting work activities accurately

F Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

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 must be clearly identified

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment

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environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to maintaining and repairing facilities associated with remote area essential service operations.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and

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RANGE STATEMENT

situations that will affect performance.

This unit must be demonstrated in relation to least two different remote area power generation facilities.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK120A Maintain operation of remote area power generation plant

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers maintenance of remote area power generation plant where the exposed voltage is not greater than 50 V a.c. or 120 V d.c. It encompasses working safely and to maintenance standards and following maintenance routines, identifying known types of power plant faults using routine procedures and completing the necessary maintenance reporting.

Application of the Unit

Application of the Unit **2)**

This unit is intended primarily for indigenous persons seeking qualifications in RAPS system servicing. The unit may also be applied to work entry qualifications in renewable energy service work in general.

Licensing/Regulatory Information

License to practice **3)**

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 V a.c. or 120 V d.c. However other conditions may apply in some States/Territories subject to regulations related to electrical work.

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License to practice **3)**

Note.

Competency requirements to be granted a license to carry out installations, fault finding, repair or maintenance on low voltage electrical installations is incorporated in unit UEENEEG105A and all prerequisite units it specifies.

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.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, 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.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting, risk safety measures etc.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEK116A	Maintain and repair remote area power generation facilities

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills

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indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Maintain operation of remote area power generation plant	1.1 OHS procedures for a RAPS plant are identified, obtained and understood through established routines and procedures
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed
	1.3 Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
	1.4 The nature and location of the power plant is obtained from documentation or from work

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ELEMENT	PERFORMANCE CRITERIA	
		supervisor to establish the scope of work to be undertaken
	1.5	Advice is sought from the work supervisor to ensure the work is coordinated effectively with fellow workers and the local community
	1.6	Sources of materials that may be required for the work are identified and accessed in accordance with established routines and procedures
	1.7	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety
2 Maintain operation of remote area power generation plant	2.1	Established OHS risk control measures and procedures for carrying out the work are followed
	2.2	Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures
	2.3	Prescribed maintenance procedures are used to test and check remote area power plant
	2.4	Known types of remote area power plant functional faults are identified and repaired using routine procedures
	2.5	Maintenance, including performance measurements and repairs are carried out safely and to prescribed routines and procedures
	2.6	Procedures are followed for referring non-routine events to immediate supervisor for directions
	2.7	Maintenance and repair work is carried out efficiently without waste of materials and energy and without damage to apparatus, circuits, the surrounding environment or services
	2.8	Routine quality checks are carried out in accordance with work instructions
3 Complete maintenance work	3.1	OHS work completion risk control measures and

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ELEMENT	PERFORMANCE CRITERIA	
and report		procedures are followed
	3.2	Work site is cleaned and made safe in accordance with routine procedures
	3.3	Procedures are followed for referring maintenance issues beyond the scope of prescribed work to persons of higher authority
	3.4	Work carried out is reported to the work supervisor through the established maintenance reporting procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence must show that knowledge has been acquired of safe working practices and maintaining operation of remote area power generation plant.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK120A **Remote area essential services power generation plant**

Evidence shall show an understanding of remote area essential services power plant maintenance to an extent indicated by the following aspects:

T1 Minor servicing of a power station‘s generating plant encompassing:

- Engine oil and filters
- Fuel filters
- Coolant filters
- Water trap devices
- Air cleaners

T2 Minor maintenance of a power station‘s generating plant encompassing:

- Fan and accessory drive belts
- Repair of minor leaks: coolant, oil and fuel

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REQUIRED SKILLS AND KNOWLEDGE

T3 Servicing of a power station‘s generating plants battery systems encompassing:

- Starting battery set
- Switchboard (nicad) batteries

T4 Information displayed by the instruments/meters in a power station encompassing:

- Generating equipment (diesel engine)
- Engine lubrication
- System oil pressure
- Engine cooling system coolant
- Temperature (in and out)
- Fuel pressure
- Current (A)
- Voltage
- Power (kW)
- Kilowatt hours
- Frequency, hertz (Hz)
- Engine running hours
- Station services: Fuel tank dip; Lubricating oil tank level;
- Fuel flow meter

T5 Use of the information gathered from instruments/meters encompassing:

- Ordering of: Fuel; Lubricating oil; Coolant
- Schedule 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; Air cleaner (both dry paper and oil bath types)

T6 Power station log sheets and readings encompassing:

- Completed log sheets
- Forwarding information to appropriate person/location at regular intervals (weekly)

T7 General cleanliness of the power stations plant and buildings encompassing:

- Generation plant
- Oil leaks
- Water leaks

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REQUIRED SKILLS AND KNOWLEDGE

- Fuel leaks
- Safety awareness
- Plant buildings
- Internal floor area
- Used consumables
- Spare parts storage
- Spider webs and other pests
- 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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

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Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites must be met.

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Evidence for competence in this unit must be considered holistically. Each element and associated performance criteria must be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence must also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this must incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Maintain operation of remote area power generation plant as described in 8) and including:

A Understanding the location and nature of the work required

B Following prescribe procedures to testing and checking plant.

C Identifying and repairing known functional faults

D Carrying out maintenance and repairs effectively.

E Identifying maintenance issues beyond the scope of prescribed work and notifying appropriate persons.

F Documenting work activities accurately.

G Dealing with unplanned events by drawing on essential knowledge and skills to provide

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appropriate solutions incorporated in a holistic assessment with the above listed items

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to maintaining operation of remote area power generation plant.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

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assessment and relationship with other units

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit must be demonstrated in relation to maintaining operation of at least two different remote area power plants.

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEK142A Apply environmentally and sustainable procedures in the energy sector

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This competency standard unit requires the worker to undertake methods of work practice that minimises energy and material usage and to seek energy reduction strategies in the energy sector workplace. The unit seeks to minimise negative impacts on the environment.

Application of the Unit

Application of the Unit **2)**

This competency standards unit shall apply to persons entering work in energy sector and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a licence to practice in the work place. However practice in this unit is subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships and the like.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work

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License to practice **3)**

platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control, lifting equipment and the like. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus, site rehabilitation and the like.

2. Compliance may be required in various jurisdictions relating to currency in first aid, confined space, lifting, risk safety measure and the like

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

There are no prerequisite competencies for this unit

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and maths skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 “Literacy and Numeracy”

Reading 3 Writing 3 Numeracy 3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

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Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Plan and prepare to apply sustainable work practice	1.1	Activities are planned and prepared for to ensure OHS policies and procedures are followed with the work appropriately sequenced in accordance with requirements
		1.2	Appropriate personnel are consulted to ensure the work is co-ordinated effectively with others involved
		1.3	Materials are obtained and checked in accordance with established procedures and to comply with requirements
		1.4	Location in which activities are to be undertaken is determined from requirements
		1.5	Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements
		1.6	Workplace environmental risks and resource efficiency issues are identified
2	Apply sustainable work practice	2.1	OHS policies and procedures for undertaking administrative functions are followed
		2.2	Activities are undertaken in accordance with requirements to implement techniques which produce energy reduction directly or indirectly
		2.3	Unplanned events or conditions are responded to in accordance with established procedures
		2.4	Approval is obtained in accordance with established procedures from appropriate personnel before any contingencies are

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ELEMENT	PERFORMANCE CRITERIA	
		implemented
	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 the application of sustainable work practice	3.1	Documentation/reports are completed to ensure detailed promotional activities requirements are met
	3.2	Suggestions are made for improvements to workplace practices to minimise energy and materials wastage
	3.3	Completion is notified in accordance with established procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and applying environmentally and sustainable work practices in the energy sector.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EK142A Environmentally and sustainable work practice

Evidence shall show an understanding of environmentally and sustainable work practices to an extent indicated by the following aspects:

T1 Sustainable work practices encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- Notion of sustainable work practice
- Effects of neglecting sustainable work practice
- The greenhouse effect - causes, consequences.
- International and national greenhouse imperatives.
- The role of regulators and similar bodies
- Legislative requirements
- Economic benefits of sustainable initiatives.

T2 Techniques for reducing carbon produced energy and hence greenhouse gases encompassing:

- domestic, commercial and industrial strategies
- trade related technologies and methods
- energy efficient retrofits (overview).
- renewable energy technologies (overview)

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit of competency and must be read in conjunction with the performance criteria and the range statement of the unit of competency and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this Competency Standard Unit and shall be used in conjunction with all components parts of this unit and, performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitude competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the Industry's preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accord

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with Industry and, Regulatory policy in this regard.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Hence, sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practiced. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

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Before the critical aspects of evidence are considered all prerequisites shall be met.

The evidence on which competency in this unit is based shall be considered holistically for each element on at least two occasions comprising:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range; and
  - Apply sustainable work practice principles and practices as specified in the performance criteria and range; and
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements. and
  - Demonstrate an appropriate level of skills enabling employment; and
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures; and
- Demonstrated performance across a representative range of contexts from the prescribed items below:
  - Participate in environmentally sustainable work practices as listed in the Range statement' and including:

A Apply sustainable work practice in daily work activities

B Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in the holistic assessment with the above listed items

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

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Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this competency standard unit.

Resources required to assess this unit are listed above in Context of assessment', which should also be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment it must ensure that the conditions for assessment are authentic and as far as possible reproduce and replicate the workplace and is consistent with the approved industry simulation policy.

In addition to the resources listed above in Context of and specific resources for assessment, evidence should show demonstrated competency in participating in environmentally sustainable work practices.

Method of assessment

9.4)

This competency standard unit shall be assessed by methods given in Volume 1, Part 3 "Assessment Guidelines".

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent

9.5)

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assessment and relationship with other units

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit of competency as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This competency standard unit shall be demonstrated in relation to participating in environmentally sustainable work practices in any of the following disciplines:

- Appliances
- Business equipment
- Computers
- Data Communications
- Electrical
- Electronics
- Fire protection
- Instrumentation and control
- Refrigeration and Air Conditioning
- Renewable / sustainable energy
- Security technology

Generic terms are used throughout this Vocational Standard shall be regarded as part of the Range of Variables in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Renewable and Sustainable Energy

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UEENEEP024A Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers attaching flexible cords and plugs to electrical equipment for connection to supplies up to 230V a.c. This may be incidental to or a primary and regular function of work related to a principle function in the workplace. It encompasses working safely, identifying plug configurations, selecting and using testing and measuring devices, terminating and connecting cords/plugs and conductors, safety testing and reporting.

Application of the Unit

Application of the Unit **4**)

This unit applies to any formal recognition for this standard at the aligned AQF 2 level or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit may require a license to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

Note:
Candidates are to meet regulator eligibility requirements by providing formal

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1.2) License to practice

confirmation from the relevant state/territory regulator for the respective work class and scope of work prior to developing and being conferred competent.

Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Employability Skills Information

Employability Skills **3)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit of competency

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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA	
1	Plan and prepare to attach flexible cord(s) and plug(s).	1.1 Work is planned and prepared to ensure OHS policies and procedures are followed, and the work is appropriately sequenced in accordance with requirements.
		1.2 Condition and ratings under which the flexible cords and plugs are to operate is determined from requirements and in consultation with appropriate personnel followed by written instruction.
		1.3 Flexible cords and plugs are selected to comply with standards and requirements for the condition and rating to be determined.
		1.4 Materials necessary to complete the work are obtained in accordance with established procedures and checked against job requirements.
		1.5 Tools, equipment and testing devices needed to carry out the work are obtained in accordance with established procedures and checked for correct operation and safety.
		1.6 Flexible cord(s) is prepared without damage to insulation and conductors and in accordance with requirements.
2	Attach flexible cord(s) and plug(s).	2.1 OHS policies and procedures are followed.
		2.2 Single insulated metal framed equipment is earthed in accordance with requirements.
		2.3 The integrity of double insulated equipment is maintained in accordance with requirements.
		2.4 Conductors are connected to terminals in accordance with requirements to ensure the required polarity is affected.

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3	Test equipment for operation and safety.	3.1 Appropriate tests of the cord(s) and plug(s) connected to the electrical equipment are conducted in accordance with requirements and to established procedures to ensure safe installation and operation.
		3.2 Ongoing checks of the quality of work are undertaken in accordance with established procedures.
4	Locate and repair fault(s) in attached flexible cord(s) and plug(s).	4.1 Electrical equipment and attached flexible cord(s) and plug(s) are isolated, where necessary, in accordance with established procedures.
		4.2 Other OHS policies and procedures are followed.
		4.3 Visual checks of the attached flexible cord(s) and plug(s) are carried out in accordance with established procedures to detect any abnormal or obvious damage or fault.
		4.4 Fault(s) in attached flexible cord(s) and plug(s) are confirmed and components to be replaced are determined and details recorded in accordance with established procedures.
		4.5 Fault(s) in attached flexible cord(s) and plug(s) are repaired in accordance with established procedures, where necessary.
		4.6 Approval is obtained in accordance with established procedures from appropriate personnel, before any contingencies are implemented.
5	Provide status report(s).	5.1 Status report(s) are completed and notified in accordance with established procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level,

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required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and attaching cords and plugs to electrical equipment for connection to a single phase 230 Volt supply.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EP024A **Flexible cords and plugs to 230 V**

Evidence shall show an understanding of flexible cords and plugs to 230 V to an extent indicated by the following aspects

T1 Safety encompassing:

* OH&S and electrical safety requirements

* requirements of AS/NZS 4836:2001 Safe working practices on low voltage installations

T2 The basic electrical circuit encompassing:

* simple electric circuit (supply, control device and load)

* symbol, units of measurement and the abbreviation for electromotive force, potential difference, current and resistance.

* drawing of a basic electrical circuit using correct symbols

* using multiples and submultiples for voltage, current and resistance values

* a.c and d.c supplies

* single phase electrical loads

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	* electrical circuit protection devices
T3 Relationships in an electrical circuit encompassing:	
	* 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
T4 Test Equipment - resistance measurement encompassing:	
	* 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 equipment
	* reasons for insulation resistance testing is conducted at higher than supply voltage (AS/NZS3000 requirements)
	* using insulation resistance hand held tester
	* care and storage of electrical instruments
	* regulatory requirements in regard to the maintenance and testing of test instrumentation for resistance measurement.
T5 Selection of flexible cords and plugs to suit given applications	

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encompassing:

* types , structures and applications of common cores (parallel two core unsheathed (‘figure 8’) cords, light duty sheathed, ordinary duty sheathed, heavy duty sheathed and textile braided)

* determining the current rating of a range of commonly used flexible cords

* service duty

* purpose of colour coding and the recommended single phase colour code and the conventional code used in the most common alternative colours

* selection of appropriate flexible cords for a range of single phase appliances in regard to application, load, and service duty

* identification of correct plug and socket polarities for the range of commonly used 230 volt plug socket combinations

* factors affecting the choice of plugs and sockets including IP rating

* selection of the correct plug and socket combinations for a range of applications including use in damp areas

T6 Connecting flexible cords and plugs to appliances encompassing:

* 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

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for which no specific earthing terminal is provided

* 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

* terminate cords to several appliances utilising the appropriate cord type and rating

T7 Testing encompassing:

* 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 active neutral and earth

* conduct insulation resistance and continuity tests prior to, and after, connecting cords and plugs to appliances

* fault finding attached cords and plugs, and cord extension leads

T8 Producing documentation and reports encompassing:

* nature and content of, and the need to produce, status reports and documents

* Producing status reports and documents

Evidence Guide

EVIDENCE GUIDE

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EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.**1**)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required

9.**2**)

Before the critical aspects of evidence are considered all

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EVIDENCE GUIDE

to demonstrate competency in this unit

prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Attach cords and plugs to electrical equipment for connection to a single phase 230 Volt supply as described in 8) and including:

A Demonstrating consistent performance for each element of the unit

B Meeting the performance criteria associated with each element of competence by employing the techniques, procedures, information and resources available in the workplace

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EVIDENCE GUIDE

C	Demonstrating an understanding of the underpinning knowledge and skills shown in the Essential Knowledge and Associated Skills section of the unit
D	Planning and preparing to attach flexible cord(s) and plug(s) up to 230 V a.c
E	Attaching, replacing and repairing flexible cord(s) and plugs(s) to equipment, safely up to 230 V a.c
F	Testing flexible cord(s), plugs(s) and connected equipment for operation and safety up to 230 V a.c., including polarity and continuity testing
G	Finding and repairing fault(s) in attached flexible cord(s) and plug(s) in accordance with established procedures
H	Providing status report(s)
I	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

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

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.
- Workplace evidence to be produced in an industry/regulator approved recording system (logbook) confirming skills development under appropriate supervision

These should be part of the formal learning/assessment environment.

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EVIDENCE GUIDE

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to attaching cords and plugs to electrical equipment for connection to a single phase 230 Volt supply.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to any cord, cable and plug connected equipment or cord extension leads intended for single-phase supplies up to 230 V.

Note:

Limitations of this unit. This unit does not cover the knowledge and skills necessary for work:

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RANGE STATEMENT

a) Competencies associated with high current faults

b) On complex electrical apparatus, circuits and electrical work

c) In hazardous areas or on electrical equipment that is part of an explosion protection technique

d) Nor competencies associated with fixed wiring.

Safe Working. Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836:2001 'Safe working on low-voltage electrical installations.'

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Custom Content Section

2.2) Literacy and numeracy skills

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Competency Field

Competency Field **5)**

Restricted and Specialisations

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UEENEEP026A Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Modification History

Release	Action	Core/Elective	Details	Points
2	Edit		Add "Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed" in **Competencies 4.1)**	

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers safety testing of electrical cord connected equipment and cord assemblies. It encompasses working safely, using portable apparatus tester, identifying faults, applying tagging, arranging for repair of faulty equipment and complete testing documentation.

Application of the Unit

Application of the Unit **2)**

This unit is intended to augment previously acquired competencies. It is suitable for employment-based programs under an approved contract of training.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit may require a license to practice in the workplace. However, practice in this unit is subject to regulations directly

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License to practice **3)**

related to occupational health and safety, general electrical safety and where applicable contracts of training such as apprenticeships.

Note:

1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, 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.

2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 ‘Literacy and Numeracy’

Reading 3 Writing 3 Numeracy 3

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Employability Skills Information

Employability Skills **5)**

This unit contains Employability Skills

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit

Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to test cord connected apparatus and cord assemblies	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work preparation measures and procedures are followed.
		1.3	Advice is sought from an appropriate person to minimise disruption to the work place.
		1.4	Cord connected apparatus and cord assemblies to be tested are obtained.
		1.5	Portable apparatus testing device is checked for correct operation and safety.
2	Test cord connected apparatus and cord assemblies	2.1	OHS risk control work measures and procedures are followed.
		2.2	Measures are followed to ensure that cord

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ELEMENT	PERFORMANCE CRITERIA	
		connected apparatus and cord assemblies to be tested are not connected to the electrical supply.
	2.3	Knowledge of electrical safety requirements and parameters are applied to safety testing to ensure correct interpretation of test results.
	2.4	Visual checks of the cord connected apparatus and cord assemblies are carried out in accordance with established procedures to detect any abnormal or obvious damage or fault.
	2.5	Approval is obtained in accordance with established procedures from appropriate personnel, before any contingencies are implemented.
	2.6	Established PAT routines are followed to test cord connected apparatus and cord assemblies.
	2.7	Unsafe cord connected apparatus and cord assemblies are identified from test results
	2.8	Testing is undertaken effectively with minimum waste of energy and damage to apparatus.
3 Tag tested cord connected apparatus and cord assemblies and document testing activities	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Cord connected apparatus and cord assemblies are tagged according to their safety status.
	3.4	Arrangements are made for unsafe cord connected apparatus and cord assemblies to be repaired by a recognised competent person.
	3.5	Safety testing activities are documented in accordance with requirements and established routines procedures.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and conduct in-service safety testing of electrical cord connected equipment and cord assemblies.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EP026A Testing and Tagging Portable and Cord Connected Electrical Apparatus

Evidence shall show an understanding of testing and tagging portable and cord connected electrical apparatus to an extent indicated by the following aspects:

T1 Australian Standards and Commonwealth/State/Territory legislation and regulations encompassing:

- Australian Standard AS/NZS 3760
- Commonwealth/State/Territory Occupational Health and Safety Acts and Regulations
- Limitations of work that can be undertaken
- Codes of Practice and associated guidance material
- Risk management principles

T2 Basic electrical testing concepts encompassing:

- 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
- Portable Appliance Testers (PAT)
- PAT maintenance and calibration

T3 Electrical equipment and cord assemblies testing encompassing:

- 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)

T4 Testing and tagging documentation requirements encompassing:

- Risk assessment documentation

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REQUIRED SKILLS AND KNOWLEDGE

- frequency of inspection and testing
- tagging of equipment
- records maintenance

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Evidence Guide

EVIDENCE GUIDE

9) The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

The Evidence Guide forms an integral part of this Unit and shall be used in conjunction with all components parts of this unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work influence decisions about how/how much the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors

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to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Conduct in-service safety testing of electrical cord

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connected equipment and cord assemblies as described in 8) and including:

a. Preparing the portable apparatus tester
b. Connecting cords and apparatus to the testing apparatus
c. Using test results to establish the safety status
d. Identifying safe and unsafe cords and apparatus
e. Applying appropriate tagging
f. Documenting testing activities
g. Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items

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.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.
- Workplace evidence to be produced in an industry/regulator approved recording system (logbook) confirming skills development under appropriate supervision

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to conducting in-service safety testing of

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electrical cord connected equipment and cord assemblies.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units **9.5)**

There are no concurrent assessment recommendations for this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to in-service safety testing of at least two different electrical cords and two different items of cord connected equipment with safety faults.

Safe Working. Safe procedures for working within in the scope of this unit shall be in accordance with AS/NZS 4836 'Safe working on low-voltage electrical installations.'

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Restricted and Specialisations

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UEENEER001B Contribute to the planning of a research project

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the ability to gather background information relevant to a research project, understand the context of the research project and contribute to the development of a research plan to achieve quality outcomes.

Application of the Unit

Application of the Unit **4**)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **2**)

2.1) **Competencies**

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3**)

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Acquire and understand background information relevant to the Research project.	1.1 Information sources about the research topic are identified and evaluated for reliability and validity.
	1.2 Information about the consumer, product, market and competition is collected, reviewed and understood.
	1.3 Key clients/stakeholders, their views and interests, are identified and recorded.

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ELEMENT		PERFORMANCE CRITERIA	
		1.4	The context (industrial, legal, ethical, political) of the research project is identified and understood.
2	Understand the Logistics of a Research Project.	2.1	Client, stakeholder and organisational requirements are identified and understood.
		2.2	Contractual obligations of the project are identified and understood.
		2.3	Resources available to support the project are identified and understood.
		2.4	Quality standards for the project are identified and understood.
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 a team environment.
		3.2	Project phases, milestones, reporting and review points are identified, in a team environment.
		3.3	Criteria for evaluating each project deliverable against pre-defined quality standards are developed, in a team environment.
		3.4	A Research Plan is developed, in a team environment.
4	Seek endorsement and ensure distribution of a Research Project Plan	4.1	The draft Research Plan is forwarded to clients/stakeholders/appropriate personnel for perusal and comment.
		4.2	The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel.
		4.3	The final Research Plan is confirmed against overall project deliverables by appropriate personnel.
		4.4	The final Research Plan is distributed to all appropriate personnel and team members.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contribute to the planning of a research project.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER001B Research project planning

Evidence shall show that knowledge has been acquired of safe working practices and contribute to the planning of a research project.

T1 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

T2 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; standard practices for ensuring a project runs to time and the like.
- Financial management - Financial management concepts; Standard practices for managing project finances; Project budgets; Costs, variations and estimations; Invoicing against project phases/deliverables; Acquittals and the like.
- 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 and the like.
- Risk management and contingencies - risk management concepts; standard practices for managing risk within a project; Internal risks; External risks; Risk minimisation; Risk removal; Contingencies and the like.
- Procurement management - procurement management concepts; standard practices

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REQUIRED SKILLS AND KNOWLEDGE

for managing procurement and the like.

- Physical Resource management - Types of physical resource, including; Equipment, Technology, Information, Facilities; Physical resource management concepts; 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; Accompanying documentation including; Contract Schedules and the like.
- Performance assessment and continuous improvement - standard performance assessment practices; standard continuous improvement practices and the like
- Engineering ethics principles

T3 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.
- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- 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, Information Management system selection and the like
- 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.

T4 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, clients and the like.
- 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; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.

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REQUIRED SKILLS AND KNOWLEDGE

- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T5 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; Reports and the like.
- 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, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- 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; Confidentiality practices to protect providers of information/research cohorts.

T6 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, 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; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to

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REQUIRED SKILLS AND KNOWLEDGE

research; Relevance to research objectives.

T7 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- 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, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
  - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, 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, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T8 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; Trialing 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 & analysis; Production; Evaluation and recommendation formulation.

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REQUIRED SKILLS AND KNOWLEDGE

T9 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- 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; Other specialty rights and the like.
- 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, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; 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; The global marketplace and the like.

T10 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, 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; Legal aspects of commercialisation.
- Commercialisation planning - Costing; Marketing; Production/development; Distribution; Sales.
- Competition - Who are the competitors? What are they doing and how quickly? Internal development relevant to competition.
- Critical analysis of the commercialisation process for continuous improvement - Successes; Opportunities for improvement; Controllable influences; Uncontrollable influences; Formulation of recommendations.

T11 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S

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REQUIRED SKILLS AND KNOWLEDGE

- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- 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

T12 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 OH&S 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.

T13 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 material safety data sheet (MSDS)

T14 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 perform a safety check before use

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REQUIRED SKILLS AND KNOWLEDGE

- 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.

T15 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

T16 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

T17 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, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T18 Life support - 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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REQUIRED SKILLS AND KNOWLEDGE

- effect of cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous

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EVIDENCE GUIDE

substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items

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EVIDENCE GUIDE

below:

- Contribute to the planning of a research project as described in 8) and including:

  A Demonstrating consistent performance for each Element of the unit

  B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace

  C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

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.

Context of and specific resources for assessment

9.**3**)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the planning of a research project.

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EVIDENCE GUIDE

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER002B	Contribute to the conduct of a research project
UEENEER003B	Contribute to the development of a product/application/service
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCMN306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER00A	Contribute to the commercialisation of a product/application/service
PMBQUAL309A	Solve problems using 'quality tools'

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Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It 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.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

The following constants and variables included in the Element/performance criteria in this unit are fully described in the Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

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Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

Custom Content Section

Competency Field **5)**

Research

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UEENEER002B Contribute to the conduct of a research project

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers the ability to identify information sources and collect and analyse information in accordance with confirmed research project objectives and compile and present results in accordance with current business practices.

Application of the Unit

Application of the Unit **4**)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) **License to practice**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Confirm research parameters	1.1 Consultation with appropriate personnel is undertaken to ensure that the scope, objectives and expected outcomes of the research are understood.
	1.2 Timeframes, available resources, budget and quality standards for the research are confirmed and understood.
	1.3 The research methodology and strategies are confirmed and understood.

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ELEMENT	PERFORMANCE CRITERIA
2 Identify sources and availability of information	2.1 The type and range of information required is clearly identified to meet research objectives.
	2.2 Information sources are identified and evaluated for their contribution to the research.
	2.3 Protocols and other procedures required to access information are clearly identified and appropriate action taken.
	2.4 Limitations on the availability of material are identified and appropriate action taken.
	2.5 Obstacles to the collection of information are identified and appropriate action taken.
3 Collect information to achieve research objectives	3.1 Information collection methods are applied correctly and consistently, in accordance with appropriate procedures and agreements reached with information sources.
	3.2 The types and range of information collected are in line with the research objectives.
	3.3 Information is recorded accurately and clearly in an appropriate format.
4 Analyse and compile research information	4.1 Methods of analysis and compilation are appropriate to the information collected and objectives of the research.
	4.2 Methodologies and procedures incorporate current technological developments and meet relevant industry standards.
	4.3 Results are obtained within the specified time, budget and quality constraints.
	4.4 Results are recorded accurately and clearly in appropriate format.
	4.5 Results are carefully interpreted and conclusions drawn.
	4.6 The results and conclusions are reviewed with appropriate personnel.

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ELEMENT	PERFORMANCE CRITERIA
5 Present research results and conclusions.	5.1 A report/summary/presentation detailing the research results and conclusions is developed in accordance with current business practices.
	5.2 Confidential information is protected in accordance with predefined agreements and/or procedures.
	5.3 All sources of information are accurately acknowledged or cited in a recognised and appropriate format.
	5.4 The success of the research methodology is evaluated against the research objectives.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the conduct of a research project.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER002B Conducting Research Projects

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the conducting of a research project.

T1 Project planning

- 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

T2 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.

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REQUIRED SKILLS AND KNOWLEDGE

- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- 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, Information Management system selection and the like
- 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.

T3 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, clients and the like.
- 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; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.
- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T4 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; Reports and the like.
- 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,

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REQUIRED SKILLS AND KNOWLEDGE

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, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- 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; Confidentiality practices to protect providers of information/research cohorts.

T5 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, 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; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

T6 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- 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, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
  - Determining the correct form of presentation for the audience, including;

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REQUIRED SKILLS AND KNOWLEDGE

colleagues, scientific community, marketing and commercialisation specialists, general community, industry, 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, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T7 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.
- Product development arrangements - Licensing agreements; Joint Ventures; Sole Ventures and the like.
- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; trialing 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 & analysis; Production; Evaluation and recommendation formulation.

T8 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- 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; Other specialty rights and the like.
- 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, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of

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REQUIRED SKILLS AND KNOWLEDGE

lawyers; 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; The global marketplace and the like.

T9 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- 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

T10 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 OH&S 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.

T11 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

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- purpose of and interpretation of material safety data sheet (MSDS)

T12 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 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.

T13 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

T14 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

T15 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, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

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REQUIRED SKILLS AND KNOWLEDGE

T16 Life support - 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 cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in

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EVIDENCE GUIDE

accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

Activities associated with normal every day work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its 'richness'. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit

9.2)

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs

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EVIDENCE GUIDE

provide a percentile graded result for the purpose of regulatory or licensing requirements.

- Demonstrate an appropriate level of skills enabling employment
- Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures

- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Contribute to the conduct of a research project as described in 8) and including:

    A Demonstrating consistent performance for each Element of the unit

    B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace

    C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

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.

Context of and specific resources for assessment

9.3)

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

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EVIDENCE GUIDE

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the conduct of a research project.

Method of assessment

9.4)

This unit shall be assessed by methods outlined in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER001B	Contribute to the planning of a research project
UEENEER003B	Contribute to the development of a product/application/service
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCMN306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER006B	Contribute to the commercialisation of a product/application/service

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PMBQUAL309A	Solve problems using 'quality tools'

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the planning of research projects. Typically this work is performed by high-level technicians, working as part of a product/application/service research and/or design, development and implementation team. It 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.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Standard Operating Procedures
- Resources

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

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Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Research

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UEENEER003B Contribute to the development of a product/application/ service

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) **Descriptor**

This unit covers the ability to assist managers to plan, coordinate and report on the development of a product/application/service.

Application of the Unit

Application of the Unit **4**)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) **License to practice**

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Contribute to the development of a design brief for a product/service/application.	1.1 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are negotiated with client(s), stakeholders and management and agreed on.
	1.2 Technical specifications, regulatory, industrial, intellectual property and market requirements of the product/application/service to be developed are confirmed.

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ELEMENT		PERFORMANCE CRITERIA	
		1.3	Resource requirements, including personnel, equipment and materials needed to develop the product/application/service area confirmed.
		1.4	Quality requirements and standards for development of the product/application/service are confirmed.
		1.5	A design brief for the product/application/service is developed in a team environment.
		1.6	Approval is obtained for the design brief from appropriate personnel.
2	Prepare to develop a product/application/service	2.1	The required outcome(s) as identified in design brief is confirmed with appropriate personnel.
		2.2	The product/application/service is developed in consultation with appropriate production personnel.
		2.3	A development procedure is formulated to: - deliver required quality outcome(s) - ensure OHS, environmental, industrial and regulatory requirements are stringently observed - ensure tooling, process, materials and equipment specifications are addressed
		2.4	Approval is obtained of the development procedure from appropriate personnel.
3	Contribute to the development of a product/application/service	3.1	The development procedure is confirmed with appropriate personnel.
		3.2	A product/application/ service product is developed in accordance with the design brief and development procedure.
		3.3	Development results are recorded in accordance with enterprise procedures.
		3.4	Develop results and identify characteristics which are outside design and development specifications are identified.

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ELEMENT	PERFORMANCE CRITERIA	
	3.5	Changes are recommended, as necessary, to achieve product/application/ service quality and production requirements.
	3.6	Approval of changes is obtained from appropriate personnel.
	3.7	Revision of the product/ application/service to achieve quality and production requirements is coordinated where necessary.
4 Document and report product/application/service development outcomes	4.1	All product/application/service development objectives are met.
	4.2	Product/application/service development reporting requirements are completed.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the development of a product/application/service.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER003B Product/application/service development

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the development of a product/application/service.

T1 Project planning

- 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

T2 Project management encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- 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; standard practices for ensuring a project runs to time and the like.
- Financial management - Financial management concepts; Standard practices for managing project finances; Project budgets; Costs, variations and estimations; Invoicing against project phases/deliverables; Acquittals and the like.
- 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 and the like.
- Risk management and contingencies - risk management concepts; standard practices for managing risk within a project; Internal risks; External risks; Risk minimisation; Risk removal; Contingencies and the like.
- Procurement management - procurement management concepts; standard practices for managing procurement and the like.
- Physical Resource management - Types of physical resource, including; Equipment, Technology, Information, Facilities; Physical resource management concepts; 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; Accompanying documentation including; Contract Schedules and the like.
- Performance assessment and continuous improvement - standard performance assessment practices; standard continuous improvement practices and the like
- Engineering ethics principles

T3 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, clients and the like.
- 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; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.

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REQUIRED SKILLS AND KNOWLEDGE

- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

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- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to

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REQUIRED SKILLS AND KNOWLEDGE

research; Relevance to research objectives.

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- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; 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; The global marketplace and the like.

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- selecting appropriate personal protective equipment (PPE) given hazardous situations

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- hierarchy of OH&S 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.

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REQUIRED SKILLS AND KNOWLEDGE

- 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.

T11 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 material safety data sheet (MSDS)

T12 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 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.

T13 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

T14 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

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REQUIRED SKILLS AND KNOWLEDGE

- 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

T15 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, fuses, circuit breakers and residual current devices – RCDs)
- protection offered by a residual current device (RCD)
- need for ensuring the (safe) isolation of an electrical supply
- appropriate method of removing an electric shock victim from a live electrical situation

T16 Life support - 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 cardio pulmonary arrest on the body.
- Managing simulated conditions of: airway obstruction; respiratory arrest and cardio pulmonary arrest,
- single and two-person cardio pulmonary resuscitation (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

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It shall be used in conjunction with all components parts of the unit and performed in accordance with the

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EVIDENCE GUIDE

Assessment Guidelines of this Training Package.

Overview of Assessment

9.1)

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. In some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

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The critical safety issues inherent in working with electricity, electrical equipment, gas or any other hazardous substance/material present a challenge for those determining competence. Sources of evidence need to be 'rich' in nature so as to minimise error in judgment.

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Critical aspects of evidence required to demonstrate competency in this unit

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Before the critical aspects of evidence are considered all prerequisites shall be met.

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EVIDENCE GUIDE

comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Contribute to the development of a product/application/service as described in 8) and including:

    A Demonstrating consistent performance for each Element of the unit

    B Meeting the performance criteria associated with each Element of the unit by employing techniques, procedures, information and resources available in the workplace

    C Demonstrating an understanding of the Underpinning Knowledge and Skills identified in the section of this unit titled 'Essential knowledge and associated skills'.

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

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EVIDENCE GUIDE

performance criteria and critical aspects of evidence shall be clearly identified.

Context of and specific resources for assessment

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This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be part of the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to contributing to the development of a product/application/service.

Method of assessment

9.4)

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:
Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires assessment in a structured environment which is intended primarily for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

For optimisation of training and assessment effort, competency development in this unit may be arranged concurrently with unit:

BSXFM1504A	Participate in, lead and facilitate work teams
UEENEER001B	Contribute to the planning of a research project

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EVIDENCE GUIDE

UEENEER002B	Conduct to the conduct of a research project
UEENEER004B	Contribute to the trial of a product/application/service
UEENEER005B	Contribute to intellectual property management
BSBCMN306A	Produce business documents
BSBSBM405A	Monitor and manage business operations
UEENEER006B	Contribute to the commercialisation of a product/application/service
PMBQUAL309A	Solve problems using 'quality tools'

Range Statement

RANGE STATEMENT

8) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit describes work conducted by technical personnel who contribute to the development of a product/application/service.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level 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 product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain sections/types of legislation, codes, regulations, Australian Standards and Intellectual Property rights

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RANGE STATEMENT

that apply to the subject matter to be researched.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

2.2) Literacy and numeracy skills

Competency Field **5)**

Research

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UEENEER004B Contribute to the trial of a product/application/ service

Modification History

Not Applicable

Unit Descriptor

Unit Descriptor **1**)

1.1) Descriptor

This unit covers the ability to assist the manager's plan, coordinate and report on a product/application/service trial.

Application of the Unit

Application of the Unit **4**)

This unit applies to any recognised development program that leads to the acquisition of a formal award at AQF level 5 or higher.

Licensing/Regulatory Information

1.2) License to practice

The skills and knowledge described in this unit do not require a licence to practice in the workplace. However, practice in this unit is subject to regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.

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Pre-Requisites

Prerequisite Unit(s) **2)**

2.1) Competencies

There are no prerequisite competencies for this unit.

Employability Skills Information

Employability Skills **3)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a unit

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Acquire and understand background information relevant to the trial of the product/application/service.	1.1 Information sources about the research topic are identified and evaluated for reliability and validity.
	1.2 Information about the consumer, product, market and competition is collected, reviewed and understood.
	1.3 Key clients/stakeholders and their particular views and interests are identified and recorded.

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ELEMENT	PERFORMANCE CRITERIA	
	1.4	The context (industrial, legal, ethical, political etc) of the research project is identified and understood.
2 Understand the logistics of a trial of a product, application and/or service	2.1	Client, stakeholder and organisational requirements are identified and understood.
	2.2	Contractual obligations of the project are identified and understood.
	2.3	Resources available to support the project are identified and understood.
	2.4	Quality standards for the project are identified and understood.
3 Contribute to the trial of a product, application and/or service	3.1	Project objectives, methodology and strategies appropriate to the requirements and contractual obligations of the project are identified and selected in a team environment.
	3.2	Project phases, milestones, reporting and review points are identified in a team environment.
	3.3	Criteria for evaluating each project deliverable against predefined quality standards are developed in a team environment.
	3.4	A Research Plan is developed in a team environment.
4 Seek endorsement and ensure distribution of a trial of a product, application and/or service	4.1	The draft Research Plan is forwarded to clients/stakeholders/ appropriate personnel for perusal and comment.
	4.2	The draft Research Plan is amended to incorporate recommended improvements from clients/stakeholders/appropriate personnel
	4.3	The final Research Plan is confirmed against overall project deliverables by appropriate personnel.
	4.4	The final Research Plan is distributed to all appropriate personnel and team members.

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Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

7) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the trial of a product/application/service.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-ER004B Product/application/service trials

Evidence shall show that knowledge has been acquired of safe working practices and contributing to the trial of a product/application/service.

T1 Project planning

- 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

T2 Research concepts encompassing:

- Terminology - Terminology used in a research workplace; Terminology used in research-specific literature and the like.
- Theory – why conduct research, The history of research; Past research successes; Past research failures; Research Protocols; Research practices and the like.
- The research environment - The research work environment; Standard research practices; Industrial, legal, ethical, political and market environment considerations; Legislation and regulation; Contractual obligations of all parties and the like.
- 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, Information Management system selection and the like
- 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.

T3 Work in a team encompassing:

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REQUIRED SKILLS AND KNOWLEDGE

- 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, clients and the like.
- 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; Leading, facilitating, participating, coaching, mentoring.
- Working with clients - client relations, client liaison, the practice of working with clients and the like.
- Conflict resolution – Personality analysis tools, Strategies for dealing with difficult people and the like.

T4 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; Reports and the like.
- 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, Speeches; Techniques for communicating to small groups, including: Meeting presentations, Team discussions, planning forums and the like.
- 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; Confidentiality practices to protect providers of information/research cohorts.

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REQUIRED SKILLS AND KNOWLEDGE

T5 Data collection techniques encompassing:

- Data types - Quantitative data, including; empirical, non-parametric, parametric; Qualitative data; Raw; Graphic; Diagrams; Original; Textual; Multimedia; Electronic and the like.
- Data Collection - Data sources; Consultation protocols and practices; Survey methodologies, including; interviews, surveys, chat rooms, 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; Data limitations.
- Evaluating data quality - Reliability; Accuracy; Clarity; Validity; Contribution to research; Relevance to research objectives.

T6 Data analysis and presentation encompassing:

- Data analysis techniques - Univariate analysis; Multivariate analysis; Decision trees; Genetic Algorithms; Neural Networks; Gap Analysis; Urgency and impact, and the like.
- 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, security and the like.
- Data interpretation - Determining results; determining conclusions; Benchmarking; Quality Assurance, including consideration of accuracy, validity, clarity and the like.
- Data presentation:
  - Determining the correct form of presentation for the audience, including; colleagues, scientific community, marketing and commercialisation specialists, general community, industry, 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, conferences, support of a new concept, need for further research, commercialisation opportunity; Quality Assurance, including accuracy, validity, clarity of information presented.

T7 Product development and trials encompassing:

- Identifying client and managerial requirements for production and trials - Required outcome(s); Key performance indicators; Timelines; Financing; Resources; Quality Assurance and the like.
- Influencing factors - Internal business goals and strategies; Technical specifications (chemical, mechanical, environmental); Industrial considerations; Regulatory considerations; Legislative considerations; Intellectual Property; Australian & International Standards; Codes of Practice; Market requirements; Resource requirements, including personnel tools and equipment (principles and practices), materials, finances and the like.Product development arrangements -

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REQUIRED SKILLS AND KNOWLEDGE

Licensing agreements; Joint Ventures; Sole Ventures and the like.

- Relevant Documentation - Codes of Practice; Standard Operating Procedures; Product formulation documentation; Material safety data sheets (MSDSs); Equipment and Quality manuals; Calibration and maintenance schedules; Enterprise recording and reporting procedures; Material, equipment and product specifications and the like.
- Development & trial processes - Proof of concept; Trialing 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 & analysis; Production; Evaluation and recommendation formulation.

T8 Intellectual property concepts encompassing:

- Intellectual Property and Australian Law - The place of Intellectual Property in Australian Law; Past cases and outcomes; Necessary considerations and the like.
- 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; Other specialty rights and the like.
- 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, Marketing consultants and the like.
- Enforcement of Intellectual Property - The enforcement process; The role of lawyers; 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; The global marketplace and the like.

T9 Occupational Health and Safety principles and fundamentals encompassing:

- underlying principles of OH&S
- general aims and objectives of the relevant state or territory legislation relating to OH&S.
- 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

T10 The work environment encompassing:

- typical hazards associated with a range of work environments

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REQUIRED SKILLS AND KNOWLEDGE

- procedures used to control the risks associated with these hazards
- principles of risk assessment / management and state the purpose of each.
- hierarchy of OH&S 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.

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REQUIRED SKILLS AND KNOWLEDGE

hearing due to excessive noise
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Range Statement

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This unit describes work conducted by technical personnel who contribute to the trial and, where necessary, retrial of products, applications and/or services to meet the requirements of a development brief.

Product/application/service design and development briefs may be provided by external and/or internal clients.

Typically the work covered by this unit is performed by high-level technicians,

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RANGE STATEMENT

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 product/application/service being developed.

This unit does not require knowledge of industry sectors, equipment and/or materials other than that in which the learner works. It assumes an understanding of the operation of all relevant business processes but does not necessarily require them to be the responsibility of the learner.

At this level, personnel should be able to interpret and explain those sections of legislation, codes, regulations, Australian Standards and Intellectual Property rights that apply to the tasks undertaken in trailing products/applications/services. They should be aware of enterprise business goals and the impact of trials on these goals.

This unit should be demonstrated in accordance with the organisation's:

- Occupational Health and Safety and Workplace Safety policies and procedures
- Goals, values, objectives, plans, systems and processes
- Business and performance plans
- Ethical standards
- Client service standards
- Quality and continuous improvement processes and standards
- Resources, which may be subject to negotiation

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not Applicable

Competency Field

2.2) Literacy and numeracy skills

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'.

Reading	5	Writing	5	Numeracy	5

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2.2) Literacy and numeracy skills

Competency Field **5**)

Research

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UEPOPS507 Conduct project management

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 undertake project management plans and conduct project work.

Project management is the application of processes, methods, knowledge, skills and experience to achieving explicitly stated objectives. Project management includes initiating, planning, executing, controlling and closing projects in line with budget and time frame constraints.

Competency in this unit requires the ability to plan and prepare, coordinate project plans and complete all documentation. Individuals will, in general, work as an operator with responsibility for project management, 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

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	**1.1** Project management scope, desired outcomes, budget and timeline dates are identified, in accordance with workplace procedures
	1.2 Resources and stakeholders are identified, availability assessed and tasks allocated, in accordance with workplace procedures and project requirements
	1.3 Preparation of technical specifications is conducted, in accordance with workplace procedures to meet project timeline dates
	1.4 Agreements with service providers and stakeholders are established, in accordance with workplace procedures and project requirements
	1.5 An integrated overview plan is prepared and distributed for review by stakeholders, in accordance with workplace procedures and project requirements
	1.6 Areas for potential overrun and resource complications are identified and are assessed for risks, in accordance with workplace procedures and project requirements
	1.7 Documentation, materials and equipment required for the project are obtained, in accordance with workplace procedures and project requirements
	1.8 Communication processes, including meetings, are organised to meet the needs of project stakeholders and service providers, in accordance with workplace procedures and project requirements
2 Coordinate project plan	**2.1** Project plan including power generation plant isolation and access requirements are coordinated, in accordance with legislative obligations, industry standards and workplace procedures
	2.2 Specialist equipment and personnel are coordinated, in accordance with workplace procedures and project requirements, to achieve desired project outcomes
	2.3 Project progress and costs are reviewed against budget targets and baseline key performance indicators
	2.4 Deviations from project management plan are identified

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		and actions are taken, in accordance with workplace procedures and project requirements to adjust project outcomes
	2.5	Deviations from project management plan requirements are reported to relevant stakeholders, in accordance with workplace procedures and project requirements
	2.6	Project is continuously reviewed in relation to workplace safety, quality control, resources, timeframes, costs and equipment, in accordance with workplace procedures
3 Complete documentation	**3.1**	Power generation plant quality assurance documents and outage reports are provided, in accordance with project requirements, legislative obligations and workplace procedures
	3.2	Power generation plant and maintenance records are updated, in accordance with workplace procedures
	3.3	Power generation plant availability is declared on completion of project, in accordance with workplace procedures
	3.4	Project performance and completion is reviewed, in accordance with workplace procedures, against plan, and opportunities for improvement are 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 Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is equivalent to UEPOPS507B Conduct project management.

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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 UEPOPS507 Conduct project management

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 stakeholders
- completing documentation including recording procedures
- coordinating project management plan including contributing to project plan
- identifying conflict of power generating plant and project work requirements
- implementing legislation, industry standards, codes of practice and regulations
- managing timelines and resources including human resource requirements including contractual procedures
- monitoring budget expenditure
- planning and preparing project using project management principles
- responding to project plan deviations
- using quality control procedures

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:

- contractual obligations
- legislation, industry standards, codes of practice and regulations
- power generating plant and equipment, its location and operating parameters
- project management planning principles, techniques and concepts
- project management work coordination
- stakeholder management techniques including liaising with contractors

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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 including:
  - quality control procedures
  - financial and contractual 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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UEPOPS520 Evaluate cost estimations and initiate appropriate solutions

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 evaluate estimated costs for planned and forced power generation plant outages (either a single item or whole unit) and to initiate appropriate solutions.

An outage is when power generation plant and/or equipment is not available to perform its intended function. Forced outage is the shutdown of power generation plant, equipment or a power generation facility when a generating unit is unavailable to produce power due to an unexpected breakdown.

Competency in this unit requires the ability to evaluate work details, identify costs, develop solutions and complete documentation. Individuals will, in general, work under supervision, in a power generation facility as an operator with responsibility for maintenance budgets.

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

UEENEEC005B Estimate electrotechnology projects

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 Evaluate work details	**1.1** Power generation plant outage work plan and methods are evaluated, in accordance with workplace procedures
	1.2 Time frames for power generation plant outage work is identified, in accordance with workplace procedures
	1.3 Details of materials, equipment, specialist services and contractual provisions are identified, in accordance with workplace procedures
	1.4 Specific disposal requirements are evaluated, in accordance with workplace procedures
2 Identify costs	**2.1** Costs associated with the planned and forced outages are evaluated, in accordance with workplace procedures
	2.2 Previous planned and forced outages are analysed, in accordance with workplace procedures, to determine problems
3 Develop solutions	**3.1** Potential solutions to limit time frame and budget over runs are identified, in accordance with workplace procedures
	3.2 Potential variations in planned and forced outages scope of work are identified, in accordance with workplace procedures, and solutions are developed
4 Complete documentation	**4.1** Evaluation report is produced, in accordance with workplace procedures
	4.2 Possible increases in budget 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.

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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 UEPOPS520A Evaluate cost estimations and initiate appropriate solutions.

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 UEPOPS520 Evaluate cost estimations and initiate appropriate solutions

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 key stakeholders
- completing documentation
- developing planned and forced outage cost solutions
- evaluating planned and forced outage details
- identifying planned and forced outage costs using data analysis
- implementing legislation, industry standards, codes of practice and regulations
- producing quotations and cost options
- recognising cause and consequences of potential costs using data analysis techniques and tools
- utilising costing and quoting 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:

- costing and quotation techniques
- costing and quotation techniques
- data analysis
- legislation, industry standards, codes of practice and regulations
- planned and forced outages
- potential solutions for outage costs
- power generation plant and equipment, its location and operating parameters

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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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UET Transmission, Distribution and Rail Sector

Modification History

Not applicable.

Credit Arrangements

Currently there are no credit transfer arrangements between qualifications in this Training Package and higher education qualifications.

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=229bace1-b7bc-4653-9300-dffb13ecfad7

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UETSS00036 Apply Access Procedures to Work On or Near Electrical Network Infrastructure

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00018 Refresher - Apply Access Procedures to Work On or Near Electrical Network Infrastructure

Description

This Skill Set is for individuals who perform the procedures to gain access for work on or near electrical network infrastructure in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00036 Refresher - Apply Access Procedures to Work On or Near Electrical Network Infrastructure Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF09	Apply access procedures to work on or near electrical network infrastructure

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires the application of access procedures to work on or near electrical network infrastructure, to meet work health and safety (WHS)/occupational health and safety (OHS), mobility and mutual aid requirements.

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Suggested words for Statement of Attainment

This UETSS00036 Refresher - Apply Access Procedures to Work On or Near Electrical Network Infrastructure Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for applying access procedures to work on or near electrical network infrastructure.

Custom Content Section

Not applicable

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UETSS00037 Apply ESI Safety Rules, Codes of Practice & Procedures for Work On or Near Electrical Apparatus

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00019 Refresher - Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus

Description

This Skill Set is for individuals who apply electricity supply industry (ESI) safety rules, codes of practice and procedures for work on or near electrical apparatus in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00037 Refresher - Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF01	Apply ESI safety rules, codes of practice and procedures for work on or near electrical apparatus

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires the application of ESI safety rules, codes of practice and procedures for work on or near electrical apparatus to meet work health and safety (WHS)/occupational health and safety (OHS), mobility and mutual aid requirements.

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Suggested words for Statement of Attainment

This UETSS00037 Refresher - Apply ESI Safety Rules, Codes of Practice and Procedures for Work On or Near Electrical Apparatus Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for applying electricity supply industry (ESI) safety rules, codes of practice and procedures for work on or near electrical apparatus.

Custom Content Section

Not applicable.

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UETSS00038 Perform Cable Pit-Trench-Excavation Rescue

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00020 Refresher - Perform Cable Pit-Trench-Excavation Rescue

Description

This Skill Set is for individuals who perform cable pit-trench-excavation rescues.

Pathways Information

The UETSS00038 Refresher - Perform Cable Pit-Trench-Excavation Rescue Skill Set is part of the UET Training Package.

Candidates must hold and be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF07	Perform cable pit/trench/excavation rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires workers to perform cable pit-trench-excavation rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00038 Refresher - Perform Cable Pit-Trench-Excavation Rescue Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry

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requirements for performing cable pit-trench-excavation rescues.

Custom Content Section

Not applicable

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UETSS00039 Perform Cable Pit-Trench-Excavation Rescue and CPR

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00021 Refresher - Perform Cable Pit-Trench-Excavation Rescue and CPR

Description

This Skill Set is for individuals who perform cable pit, trench and/or excavation rescues and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00039 Refresher - Perform Cable Pit-Trench-Excavation Rescue and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 units of competency must be attained.

HLTAID001	Provide cardiopulmonary resuscitation
UETTDRRF07	Perform cable pit/trench/excavation rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires workers to perform cable pit/trench/excavation rescues and CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

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Suggested words for Statement of Attainment

This UETSS00039 Refresher - Perform Cable Pit-Trench-Excavation Rescue and CPR Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing cable pit-trench-excavation rescue and cardiopulmonary resuscitation (CPR).

Custom Content Section

Not applicable

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UETSS00040 Perform CPR

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00022 Refresher - Perform CPR

Description

This Skill Set is for individuals who perform cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

UETSS00040 Refresher - Perform CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

HLTAID001	Provide cardiopulmonary resuscitation

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00040 Refresher - Perform CPR Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing cardiopulmonary resuscitation (CPR).

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Custom Content Section

Not applicable.

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UETSS00041 Perform EWP Controlled Descent Escape

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00023 Refresher - Perform EWP Controlled Descent Escape

Description

This Skill Set is for individuals who perform elevated work platform (EWP) controlled descent escapes in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00041 Refresher - Perform EWP Controlled Descent Escape Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF08	Perform EWP controlled descent escape

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing EWP controlled descent escapes to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00041 Refresher - Perform EWP Controlled Descent Escape Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing elevated work platform (EWP) controlled descent escapes.

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Custom Content Section

Not applicable.

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UETSS00042 Perform EWP Rescue

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00024 Refresher - Perform EWP Rescue

Description

This Skill Set is for individuals who perform elevated work platform (EWP) rescues in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00042 Refresher - Perform EWP Rescue Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF03 Perform EWP rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing EWP rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00042 Refresher - Perform EWP Rescue Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing

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elevated work platform (EWP) rescues.

Custom Content Section

Not applicable.

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UETSS00043 Perform EWP Rescue and CPR

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00025 Refresher - Perform EWP Rescue and CPR

Description

This Skill Set is for individuals who perform elevated work platform (EWP) rescues and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00043 Refresher - Perform EWP Rescue and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 units of competency must be attained.

HLTAID001	Provide cardiopulmonary resuscitation
UETTDRRF03	Perform EWP rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing EWP rescues and CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00043 Refresher - Perform EWP Rescue and CPR Skill Set from the UET

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Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing elevated work platform (EWP) rescues and cardiopulmonary resuscitation (CPR).

Custom Content Section

Not applicable.

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UETSS00044 Perform Pole Top Rescue

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00026 Refresher - Perform Pole Top Rescue

Description

This Skill Set is for individuals who perform pole top rescues in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00044 Refresher - Perform Pole Top Rescue Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF02 Perform pole top rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing pole top rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00044 Refresher - Perform Pole Top Rescue Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing

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pole top rescues.

Custom Content Section

Not applicable.

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UETSS00045 Perform Pole Top Rescue and CPR

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00027 Refresher - Perform Pole Top Rescue and CPR

Description

This Skill Set is for individuals who perform pole top rescues and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00045 Refresher - Perform Pole Top Rescue and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 units of competency must be attained.

HLTAID001	Provide cardiopulmonary resuscitation
UETTDRRF02	Perform pole top rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing pole top rescues and CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00045 Refresher - Perform Pole Top Rescue and CPR Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for

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performing pole top rescues and cardiopulmonary resuscitation (CPR).

Custom Content Section

Not applicable.

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UETSS00046 Perform Rescue from a Live LV Panel

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00028 Refresher - Perform Rescue from a Live LV Panel

Description

This Skill Set is for individuals who perform rescues from live low voltage (LV) panels in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00046 Refresher - Perform Rescue from a Live LV Panel Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and shall be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF06 Perform rescue from a live LV panel

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing rescues from a live LV panel to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00046 Refresher - Perform Rescue from a Live LV Panel Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for

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performing rescues from live low voltage (LV) panels.

Custom Content Section

Not applicable.

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UETSS00047 Perform Rescue from a Live LV Panel and CPR

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00029 Refresher - Perform Rescue from a Live LV Panel and CPR

Description

This Skill Set is for individuals who perform rescues from live low voltage (LV) panels and cardiopulmonary resuscitation (CPR) in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00047 Refresher - Perform Rescue from a Live LV Panel and CPR Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 units of competency must be attained.

HLTAID001	Provide cardiopulmonary resuscitation
UETTDRRF06	Perform rescue from a live LV panel

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing rescues from live LV panels and CPR to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00047 Refresher - Perform Rescue from a Live LV Panel and CPR Skill Set from

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the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing rescues from live low voltage (LV) panels and cardiopulmonary (CPR).

Custom Content Section

Not applicable.

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UETSS00048 Perform Rescue from Switchyard Structures at Heights

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00030 Refresher - Perform Rescue from Switchyard Structures at Heights

Description

This Skill Set is for individuals who perform rescues from switchyard structures at heights in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00048 Refresher - Perform Rescue from Switchyard Structures at Heights Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and shall be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF05	Perform rescue from switchyard structures at heights

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing rescues from switchyard structures at heights to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

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Suggested words for Statement of Attainment

This UETSS00048 Refresher - Perform Rescue from Switchyard Structures at Heights Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing rescues from switchyard structures at heights.

Custom Content Section

Not applicable.

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UETSS00049 Perform Switchyard Rescue at Heights and Provide First Aid

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00031 Refresher - Perform Switchyard Rescue at Heights and Provide First Aid

Description

This Skill Set is for individuals who perform switchyard rescues at heights and provide first aid in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00049 Refresher - Perform Switchyard Rescue at Heights and Provide First Aid Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and shall be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 units of competency must be attained.

UETTDRRF05	Perform rescue from switchyard structures at heights
UETTDRRF10	Provide first aid in an ESI environment

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing switchyard rescues at heights and provide first aid to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

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Suggested words for Statement of Attainment

This UETSS00049 Refresher - Perform Switchyard Rescue at Heights and Provide First Aid Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing switchyard rescues at heights and providing first aid.

Custom Content Section

Not applicable.

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UETSS00050 Perform Tower Rescue

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00032 Refresher - Perform Tower Rescue

Description

This Skill Set is for individuals who perform tower rescues in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00050 Refresher - Perform Tower Rescue Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and shall be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF04 Perform tower rescue

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing tower rescues to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00050 Refresher - Perform Tower Rescue Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing

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tower rescues.

Custom Content Section

Not applicable.

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UETSS00051 Perform Tower Rescue and Provide First Aid

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00033 Refresher - Perform Tower Rescue and Provide First Aid

Description

This Skill Set is for individuals who perform tower rescues and provide first aid in the context of transmission, distribution or rail work functions.

Pathways Information

The UETSS00051 Refresher - Perform Tower Rescue and Provide First Aid Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and shall be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 2 units of competency must be attained.

UETTDRRF04	Perform tower rescue
UETTDRRF10	Provide first aid in an ESI environment

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires performing tower rescues and providing first aid to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

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Suggested words for Statement of Attainment

This UETSS00051 Refresher - Perform Tower Rescue and Provide First Aid Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for performing tower rescues and providing first aid.

Custom Content Section

Not applicable.

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UETSS00052 Provide First Aid in an ESI Environment

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00034 Refresher - Provide First Aid in an ESI Environment

Description

This Skill Set is for individuals who provide first aid in an electricity supply industry (ESI) environment in the context of transmission, distribution or rail work functions.

Pathways Information

UETSS00052 Refresher - Provide First Aid in an ESI Environment Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Candidates must hold and shall be current in the unit: HLTAID001 Provide cardiopulmonary resuscitation.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF10 Provide first aid in an ESI environment

Target Group

The Skill Set is targeted at ESI workers who undertake the installation and/or maintenance of network infrastructure which requires providing first aid in an ESI environment to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00052 Refresher - Provide First Aid in an ESI Environment Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the industry requirements for

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providing first aid in an electricity supply industry (ESI) environment.

Custom Content Section

Not applicable.

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UETSS00053 Testing of Connections to Low Voltage Electricity Networks

Modification History

Release 1. New Skill Set

This Skill Set replaces and is equivalent to UETSS00035 Refresher - Testing of Connections to Low Voltage Electricity Networks

Description

This Skill Set is for individuals who test connections to low voltage (LV) electricity networks in the context of transmission, distribution or rail work functions.

Pathways Information

UETSS00053 Refresher - Testing of Connections to Low Voltage Electricity Networks Skill Set is part of the UET Transmission, Distribution and Rail Sector Training Package.

Licensing/Regulatory Information

Not applicable.

Skill Set Requirements

A total of 1 unit of competency must be attained.

UETTDRRF11	Testing of connections to low voltage electricity networks

Target Group

The Skill Set is targeted at electricity supply industry (ESI) workers who undertake the installation and/or maintenance of network infrastructure which requires testing connections to LV electricity networks to meet work health and safety (WHS)/occupational health and safety (OHS) mobility and mutual aid requirements.

Suggested words for Statement of Attainment

This UETSS00053 Refresher - Testing of Connections to Low Voltage Electricity Networks Skill Set from the UET Transmission, Distribution and Rail Sector Training Package meets the

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industry requirements for testing connections to low voltage (LV) electricity networks.

Custom Content Section

Not applicable.

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