



Australian Government

UETDRDS019 Design distribution substations

Release: 1

UETDRDS019 Design 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 Release 4.0.

Application

This unit includes the skills and knowledge required to design distribution substations in the electricity supply industry (ESI).

It includes design specifications, site requirements, systems modelling, sustainable energy principles, and compliance requirements.

It also includes identification, minimisation or elimination of health and safety risks by using safety and control measures.

The application of the skills and knowledge described in this unit may require a licence/registration to practice in the workplace.

Other conditions may also apply under state and territory legislative and regulatory licensing requirements which must be confirmed prior to commencing this unit.

Pre-requisite Unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UETDREL005 Work safely in the vicinity of live electrical apparatus

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 to design distribution substations

- 1.1** Project requirements are determined
- 1.2** Design specifications are determined in accordance with workplace requirements
- 1.3** Tools, equipment and personal protective equipment (PPE) required for site inspections are determined, obtained and confirmed in working order
- 1.4** Requirements for site inspections are determined in accordance with workplace requirements
- 1.5** Work is prioritised and sequenced for completion in accordance with workplace requirements

2 Design distribution substations

- 2.1** Site inspection is performed
- 2.2** Distribution substations are designed in accordance with workplace requirements
- 2.3** Systems modelling is used to evaluate and determine best outcomes in accordance with workplace requirements
- 2.4** Sustainable energy principles are used to evaluate and determine best outcomes in accordance with workplace requirements
- 2.5** Design is checked for compliance against legislation, regulations, standards and codes of practice
- 2.6** Health and safety risks are identified and minimised or eliminated by using safety and control measures in the design process
- 2.7** Quality checks of work are undertaken in accordance with workplace requirements

3 Complete work and documentation

- 3.1** Completed work is checked against project and workplace requirements

- 3.2** Work records, reports and documentation are completed, approved and appropriate personnel notified in accordance with workplace 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 UET Transmission, Distribution and Rail Sector Training Package Companion Volume Implementation Guide.

Unit Mapping Information

This unit replaces and is not equivalent to UETDRDS003 Design power system distribution substations.

Links

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

Assessment Requirements for UETDRDS019 Design distribution substations

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria on at least two (2) separate occasions and include:

- determining project requirements
- determining design specifications
- obtaining, inspecting and using relevant personal protective equipment (PPE) for site inspection
- determining requirements for site inspections in accordance with workplace requirements
- prioritising and sequencing work for completion in accordance with workplace requirements
- performing at least one (1) site inspection
- demonstrating use of systems modelling to evaluate and determine best outcomes
- applying sustainable energy principles and practices
- checking design for compliance against legislation, regulations, standards and codes of practice
- identifying, and minimising or eliminating health and safety risks by using safety and control measures
- performing ongoing quality checks of work in accordance with workplace requirements
- checking final design against project and workplace requirements
- completing six (6) designs from at least two (2) of the following project types:
 - single transformer substations
 - multi-transformer substation
 - upgrade/alteration to existing assets
- drafting all of the following for each design:
 - single line diagram
 - above ground layout diagram
 - earthing layout diagram
 - primary plant dimensioning checklist
 - standards compliance checklist
 - hazard identification, risk assessment and control measures.

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:

- distribution substation design, including:
 - project requirements
 - design specifications
 - hazard, risk assessment and risk control requirements, including potential hazards
 - types and application of PPE
 - site inspections
 - use of systems modelling for best outcomes
 - application of sustainable energy principles and practices
 - compliance with legislation, regulations, standards, codes of practice, and project and workplace requirements
 - work records, reports and documentation
 - manuals, diagrams and drawings
- the purpose and features of typical co-generation systems and associated network constraints
- substations and power transformers including:
 - characteristics
 - testing and commissioning
 - maintenance
 - metering and control equipment
 - switchgear
 - earthing
 - surge protection
 - auxiliary equipment
- transformers, including:
 - types
 - characteristics
 - basic construction
 - operation under load/no-load conditions
 - types and operation of tap changing switches
 - efficiency and cooling
 - auxiliary equipment
 - maintenance
 - restrictions to parallel operation
 - harmonics issues and remedies
 - testing and fault-finding procedures
- high voltage (HV) switchgear, including:
 - protection and alarms

- operating limitations
- protection device rating
- switching equipment and practices
- paralleling requirements
- isolation and earthing procedures
- common distribution faults
- automation systems, including:
 - function
 - main components
 - operation procedure
- layout principles for a distribution substation including:
 - relationship to overall power system
 - purpose
 - location
 - equipment layout
- fire and oil management, including
 - bund design
 - flame traps
 - oil/water separation 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:

- relevant and appropriate materials, tools, equipment and PPE currently used in industry
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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