



Australian Government

UEEEL0025 Test and connect transformers

Release: 2

UEEEL0025 Test and connect transformers

Modification History

Release 2. This is the second release of this unit of competency in the UEE Electrotechnology Training Package.

Performance criteria numbering corrected in element 2

Typographic error fixed in performance criteria 2.5

Workplace evidence requirements removed from Assessment Conditions.

Assessor requirements updated in Assessment Conditions.

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

Application

This unit involves the skills and knowledge required to solve problems in transformers. It includes safe working practices, ascertaining correct operation of transformers and solving problems as they apply to servicing, fault finding, installation and compliance work functions.

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

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

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

Pre-requisite Unit

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

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEECD0020 Fix and secure electrotechnology equipment

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

UEEEL0019 Solve problems in direct current (d.c.) machines

UEEEL0021 Solve problems in magnetic and electromagnetic devices

UEEEL0020 Solve problems in low voltage a.c. circuits

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to test and connect transformers

PERFORMANCE CRITERIA

Performance criteria describe the performance needed to demonstrate achievement of the element.

- 1.1** WHS/OHS requirements and workplace procedures for a given work area are identified and applied
- 1.2** Hazards are identified, risk are assessed and control measures and workplace procedures are implemented
- 1.3** Safety hazards which have not previously been identified are noted on job safety assessments and existing risk control measures are implemented
- 1.4** Nature of transformer problem is obtained from documentation, service manual or work supervisor to determine scope of work
- 1.5** Advice is sought from work supervisor to ensure the work is coordinated effectively with others
- 1.6** Materials required for work are determined in accordance with workplace procedures
- 1.7** Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation

and safety

2 Solve problems in transformers

- 2.1** WHS/OHS risk control measures and workplace procedures for carrying out work are followed
- 2.2** Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures
- 2.3** Relevant circuits, machines and/or plant are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures
- 2.4** Problem-solving methods are used to resolve problems from measured and calculated values as they apply to transformers
- 2.5** Transformer is verified as electrically safe and connected to electrical supply and commissioned in accordance with workplace procedures and industry standards
- 2.6** Problems are resolved without damage to circuits, the surrounding environment or services using sustainable energy practices

3 Complete work and document activities

- 3.1** WHS/OHS work completion risk control measures and workplace procedures are followed
- 3.2** Worksite is cleaned and made safe in accordance with workplace procedures
- 3.3** Justification for solutions used to solve machine problems is documented in accordance with workplace procedures
- 3.4** Work completion is documented and an appropriate person/s notified in accordance with workplace procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

Range is restricted to essential operating conditions and any other variables essential to the work environment.

Non-essential conditions may be found in the UEE Electrotechnology Training package Companion Volume Implementation Guide.

Testing and connecting transformers must be demonstrated in relation to solving problems in any three of the following transformers:

- power transformers
- current transformers
- voltage transformers
- auto-transformers
- isolation transformers
- welding transformers
- step-up and step-down transformers

Unit Mapping Information

No equivalent unit.

Links

Companion Volume Implementation Guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6>

Assessment Requirements for UEEEL0025 Test and connect transformers

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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, performance criteria and range of conditions on at least two separate occasions and include:

- applying work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures, including:
 - identifying and assessing hazards and risks, and implementing control measures
 - applying safe working procedures when connecting and testing transformers
 - checking circuits are isolated in accordance with workplace procedures and regulatory requirements
- solving problems with transformers, including:
 - determining the operating parameters of an existing transformer
 - altering an existing transformer circuit to comply with specified operating parameters
 - developing transformer circuits to comply with a specified function and operating parameters
 - determining the cause of low efficiency in an existing transformer
 - determining conditions causing an existing circuit to be unsafe
- determine polarity markings for an unidentified single phase double wound transformer
- determining the value of a transformers secondary voltage and current from nameplate data when solving problems in transformer operations
- determining voltage and current in the windings of an auto-transformer by calculation
- selecting transformers for specific application
- testing serviceability of transformers
- applying sustainable energy principles and practices

- completing problem-solving activities documentation.

Knowledge Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy all of the requirements of the elements, performance criteria and range of conditions and include knowledge of:

- AS/NZS 3000 Electrical installations requirements and restrictions on the installation and use of transformers
- methods used to insulate low voltage (LV) and high voltage (HV) transformers
- types of information stated on transformer nameplates
- types of lamination style and core construction used in transformers
- relevant industry standards relating to transformers
- application of transformers
- transmission and distribution transformers
- construction of voltage transformers
- ratings of voltage transformers
- auto-transformers and instrument transformers, including:
 - advantages and disadvantages of an auto-transformer
 - risks and safety control measures associated with connection and disconnection of instrument transformers
 - connection diagrams for instrument transformers
 - applications for auto-transformers and instrument transformers
 - construction of current transformers
 - ratings of current transformers
- transformer operation, including:
 - principles of mutual induction of a transformer
 - factors that determine the induced voltage in a transformer winding
 - determining the value of a transformer's secondary voltage and current given one winding's electrical details and turns ratio
 - identification of voltage and current components of a phasor diagram for a transformer on no-load
 - principles of power transferred from the primary to secondary when a load is connected using a phasor diagram neglecting impedance drops
 - safety features specified in relevant industry standards with respect to transformers and isolating transformers
 - determining circuit operating characteristics when solving problems in LV transformers
- transformer losses, efficiency and cooling, including:
 - methods used for natural and forced cooling of transformers
 - power losses which occur in a transformer
 - tests which allow the power losses of a transformer to be determined

- relationship between transformer cooling and rating
- transformer voltage regulation including:
 - reasons for voltage variation in the output of a transformer
 - voltage regulation as applicable to a transformer
- percentage impedance, including:
 - as applied to transformers
 - techniques for determining percentage impedance of a transformer by relevant calculation
- parallel operation of transformers, including:
 - need for parallel operation of transformers
 - techniques for connecting in parallel to supply a single load (loading on transformers operating in parallel)
 - conditions/restrictions required before two transformers can be connected in parallel
 - the consequences/effect of an incorrect connection
- relevant manufacturer specifications.

Assessment Conditions

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

Assessors must also hold the occupational licence for the jurisdiction the assessment is occurring where the activity being assessed requires a licence to practice.

Assessment must satisfy the Principles of Assessment and Rules of Evidence and all regulatory requirements included within the Standards for Registered Training Organisations current at the time of assessment.

Assessment must occur in suitable workplace operational situations where it is appropriate to do so, where this is not appropriate, assessment must occur in suitable simulated workplace operational situations that replicate workplace conditions.

Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

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