



Australian Government

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

Release: 2

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

Modification History

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

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 determine correct operation of direct current (d.c.) machines and provide solutions as they apply to electrical installations and equipment.

It includes working safely, the use of testing and measuring devices, and providing solutions derived from measurements and calculations to predictable problems in d.c. machines.

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

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

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

Pre-requisite Unit

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

UEEEL0021 Solve problems in magnetic and electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0044 Solve problems in multiple path circuits

UEECD0046 Solve problems in single path circuits

Competency Field

Electrical

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to work with d.c. machines

2 Solve d.c. machine problems

PERFORMANCE CRITERIA

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

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| 1.1 | Device/s and/or circuit/s problems are identified from documentation or work supervisor to determine scope of work |
| 1.2 | WHS/OHS requirements and workplace procedures for a given work area are identified and applied |
| 1.3 | Hazards are identified, risks are assessed and control measures are implemented |
| 1.4 | Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety |
| 1.5 | Advice is sought from the work supervisor to ensure work is coordinated effectively with others |
| 2.1 | WHS/OHS risk control measures and workplace procedures for carrying out work are followed |
| 2.2 | Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures |
| 2.3 | Relevant circuits, machines and/or plant are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures |
| 2.4 | Operating parameters of a machine are determined from nameplate details |

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| | 2.5 | Electrical measurements are completed and readings compared with nameplate ratings |
| | 2.6 | Methodical techniques are used to identify and resolve problems from measured and calculated values as they apply to machines |
| | 2.7 | Machine is connected and tested to determine correct operation |
| | 2.8 | Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment |
| | 2.9 | Problems are resolved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices |
| 3 | Complete work and documentation | |
| | 3.1 | WHS/OHS work completion risk control measures and workplace procedures are followed |
| | 3.2 | Worksite is cleaned and made safe in accordance with workplace procedures |
| | 3.3 | Justification for solutions used to resolve problems is documented in accordance with established workplace procedures |
| | 3.4 | Work completion is documented and appropriate person/s notified in accordance with workplace procedures |

Foundation Skills

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

Range of Conditions

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

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

Solving problems in d.c. machines must include at least two of the following:

- shunt generator
- series generator
- compound generator

- permanent magnet d.c. motor
- separately excited d.c. motor
- shunt d.c. motor
- series d.c. motor
- compound motor
- printed circuit motor
- brushless motor
- stepped motor

Unit Mapping Information

No equivalent unit

Links

Companion Volume Implementation Guides are found in VETNet -

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

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

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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:

- complying work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
 - identifying safety risks associated with using generators, motors, rotating machinery and inductive loads
 - confirming isolation of circuits
- connecting and testing a direct current (d.c.) machine
- identifying of faults in a machine from electrical measurements
- recording electrical measurements and comparing with nameplate ratings
- reversing the direction of rotation of a d.c motor
- ensuring all work complies with relevant industry standards and legislation
- completing required documentation and reporting.

Knowledge Evidence

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

- rotating machine construction, testing and maintenance, including:
 - care, maintenance and testing processes for rotating machines
 - components of a d.c. machine
 - difference between a generator and a motor in terms of energy conversion
 - nameplate of a machine
 - safety risks associated with using rotating machinery
 - types of faults in electric machines
- generators, including:
 - basic operation of a d.c. generator
 - equivalent circuit for a d.c. generator
 - importance of residual magnetism for a self-excited generator
 - load characteristics of a d.c. generator
 - methods of excitation used for d.c. generators
 - open circuit characteristics of d.c. generators
 - prime movers, energy sources and energy flow used to generate electricity
 - reversing the polarity of a d.c. generator
 - types of d.c. generators and their applications
 - calculating generated and terminal voltage of a d.c. shunt generator
 - applying Fleming's left-hand rule for motors and right-hand rule for generators
- motors, including:
 - basic operation of a motor
 - circuit diagrams and characteristics of the different types of d.c. motors
 - effect of back emf in d.c. motors
 - equivalent circuit for the types of d.c. motors
 - operation of a motor and its energy flow
 - safety risks associated with using motors (including risks of series d.c. motors)
 - torque as the product of the force on the conductors and the radius of the armature/rotor
 - calculating force and torque developed by a motor
 - types of d.c. motors and their applications
- machine efficiency, including:
 - efficiency characteristic of a d.c. machine and the conditions for maximum efficiency
 - losses that occur in a d.c. machine
 - methods used to determine the losses in a d.c. machine
 - calculating losses and efficiency of a d.c. machine
 - methods used to maintain high efficiency
- safety considerations for inductive loads
- relevant manufacturer specifications

Assessment Conditions

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

Assessors must also hold 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 workplace operational situations where it is appropriate to do so; where this is not appropriate, assessment must occur in simulated workplace operational situations that replicate workplace conditions.

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

Resources for assessment must include access to:

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

Links

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