



**Australian Government**

# **UEEEL0066 Rewind LV direct current machines**

**Release: 1**

# UEEEL0066 Rewind LV direct current machines

## Modification History

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

## Application

This unit involves the skills and knowledge required to prepare, place and connect coils and insulating in direct current (d.c.) motor armatures and poles.

It includes preparing to and rewinding d.c. machines by working safely, using tools, measuring and stator windings. It also includes applying technical and quality industry standards and completing workplace reports and winding records.

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

## Pre-requisite Unit

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

UEECD0019 Fabricate, assemble and dismantle utilities industry components

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

UEEEL0074 Wind electrical coils

UEEEL0056 Place and connect electrical coils

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

UEEEL0021 Solve problems in electromagnetic devices

and

UEECD0043 Solve problems in direct current circuits

or

UEECD0046 Solve problems in single path circuits

UEECD0044 Solve problems in multiple path circuits

## Competency Field

Electrical

## Unit Sector

Electrotechnology

## Elements and Performance Criteria

### ELEMENTS

Elements describe the essential outcomes.

#### **1 Prepare to rewind d.c. machine**

### PERFORMANCE CRITERIA

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

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied
- 1.2** Existing WHS/OHS risk control measures for work preparation are followed
- 1.3** Scope of work is determined from job specifications and regulatory requirements
- 1.4** Advice is sought from the work supervisor to ensure the work is coordinated effectively with others
- 1.5** Winding data is obtained from winding data records or directly from measurements of stator and recorded in accordance with workplace procedures
- 1.6** Materials required for the work are obtained in accordance with workplace procedures and job specification
- 1.7** Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety

#### **2 Rewind d.c. machine**

- 2.1** Existing WHS/OHS risk control work measures are followed
- 2.2** Machines/equipment are checked and isolated in accordance with WHS/OHS requirements and workplace procedures
- 2.3** Induction machine is dismantled and parts tagged and stored to prevent loss or damage in accordance with workplace procedures and instructions
- 2.4** Winding is stripped from stator in accordance with

|                                     |                                                                                                                                                                                       |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     | workplace procedures                                                                                                                                                                  |
| <b>2.5</b>                          | Armature and fields are wound and insulated in accordance with winding data, job specifications and workplace procedures                                                              |
| <b>2.6</b>                          | Machine is assembled and prepared for inspection and testing in accordance with workplace procedures                                                                                  |
| <b>2.7</b>                          | Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment                                              |
| <b>2.8</b>                          | Routine quality checks are conducted to ensure coils are correctly wound, with correct wire, number of turns and shape in accordance with workplace procedures and job specifications |
| <b>2.9</b>                          | Electrical coil work is completed in timeframe, environment and workplace conditions                                                                                                  |
| <b>3 Complete workplace reports</b> | <b>3.1</b> WHS/OHS work completion risk control measures are followed                                                                                                                 |
|                                     | <b>3.2</b> Workplace report, forms/data sheets are completed accurately in accordance with workplace procedures                                                                       |

## Foundation Skills

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

## Range of Conditions

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

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

Dismantling and winding armatures and field coils must include the following:

- three different d.c. machines in an environment designed specifically for the purpose

## Unit Mapping Information

This unit replaces and is equivalent to UEENEEG154A Rewind LV direct current machines.

## 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 UEEEL0066 Rewind LV direct current machines

## Modification History

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

## Performance Evidence

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

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures and practices, including using risk control measures
- applying sustainable energy principles and practices
- completing workplace reports and documentation
- dealing with unplanned events in accordance with workplace procedures in a manner that minimises risk to personnel and equipment
- inspecting and testing of completed machine work
- planning to rewind low voltage (LV) direct current (d.c.) machines
- rewinding d.c. machines rated for LV, including:
  - adhering to quality workplace procedures
  - assembling machine and preparing for testing
  - completing workplace reports/forms accurately
  - dismantling machine and storing parts securely
  - following winding specifications
  - preparing stator for winding
  - selecting correct coils and insulation
  - winding and connecting armature and fields correctly
  - checking dimensions
- using tools safely in accordance with workplace procedures.

## Knowledge Evidence

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

- commutation and interpoles, including:
  - conditions for sparkless commutation and methods used to reduce sparking

- interpoles or commutating poles
- principles of commutation and advantages of interpoles
- resistance and electromagnetic field commutation
- current industry practices and technologies
- d.c. motor winding techniques
- calculations and insulation specifications, including:
  - calculation of a half coil length and the amount of copper required
  - commutators and identification of insulation specifications
  - preparation of coils and equalisers
  - preparation of copper prior to insulating coils and equalisers on armatures
- commutation and interpoles
- critical details and measurements when stripping a stator of a d.c. machine, including:
  - lap winding with equalisers
  - types of windings
  - wave winding
  - winding layout
- d.c. armature windings, including:
  - lap and wave windings, progressive and retrogressive windings
  - terms
- preparation for rewinding, including:
  - checking the condition of a stripped core
  - core loss test
  - hot spots in armature core
  - testing commutator before use
  - removing of old winding
- principles and construction, including:
  - construction of d.c. machine
  - d.c. machine types
  - types of armature windings, including parallel circuits
  - value of generated electromagnetic field
- procedures and precautions required when inspecting, testing and/or re-using a commutator, including:
  - coil position and commutator segment relationship
  - commutator wear ring
  - removal of armature leads on tungsten inert gas (TIG) welded commutator
  - TIG welded and soft soldered commutators
- selection of appropriate insulation, including:
  - B stage and VPI insulation
  - dielectric strength, temperature rating,
  - insulation properties, method of application and specific uses

- insulations used on the slot portion and overhang
- manufacturer recommendations
- reason for selecting a particular insulation
- simplex armature lap windings and wave windings, including:
  - characteristics and applications
  - commutator pitch
  - number and position of brushes
- electrical power systems LV
- identification of insulation specifications
- relevant job safety assessments or risk mitigation processes
- relevant manufacturer specifications
- relevant safe working practices
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- simplex lap windings, including equalising connections for armature windings
- simplex wave windings, including dummy coils, comparison of lap and wave windings, and armature winding calculations
- sustainable energy principles and practices
- testing techniques, including continuity, insulation testing, use of ‘growler’ and magnetic field testing.

## Assessment Conditions

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

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

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

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

Resources for assessment must include access to:

- a range of relevant exercises, case studies and/or other simulations
- relevant and appropriate materials, tools, facilities, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to rewinding LV d.c. machines
- applicable documentation, including workplace procedures, equipment specifications, regulations, relevant industry standards, codes of practice and operation manuals.

## Links

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