



Australian Government

UEEEL0064 Rewind HV three phase induction machines rated for voltages above 3.3 kV

Release: 1

UEEEL0064 Rewind HV three phase induction machines rated for voltages above 3.3 kV

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 rewind high voltage (HV) three phase induction machines rated for voltages above 3.3 kilovolt (kV).

It includes preparing and rewinding three phase induction machines rated voltage above 3.3 kV, applying technical and quality industry standards and keeping 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

UEEEL0068 Rewind three phase low voltage induction machines

UEEEL0065 Rewind HV three phase induction machines rated for voltages to 3.3 kV

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

PERFORMANCE CRITERIA

Elements describe the essential outcomes.

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

1 Prepare to rewind three phase induction machines

- 1.1** Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied
- 1.2** WHS/OHS risk control measures for work preparation are followed
- 1.3** Scope of work is determined in accordance with workplace procedures for work specifications and relevant industry standards
- 1.4** Advice is sought from the work supervisor to ensure work is coordinated effectively with others
- 1.5** Induction machine is dismantled, parts tagged and stored to prevent loss or damage
- 1.6** Winding data is obtained from records or from measurements of stator and recorded in accordance with workplace procedures
- 1.7** Winding is stripped from stator in accordance with workplace procedures
- 1.8** Materials required for the work are obtained in accordance with workplace procedures
- 1.9** Tools, equipment and testing devices required for work are obtained and checked for operation and safety

2 Rewind three phase induction machines

- 2.1** WHS/OHS risk control work measures and workplace procedures are followed
- 2.2** Machines/equipment are isolated in accordance with WHS/OHS requirements and workplace procedures
- 2.3** Stator is wound and insulated to 3.3 kV standards in

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| | | accordance with workplace procedures and relevant industry standards |
| | 2.4 | Machine is assembled and prepared for final testing in accordance with workplace procedures |
| | 2.5 | Problem-solving techniques are used to resolve unplanned events |
| | 2.6 | Quality checks are conducted to ensure coils are correctly wound with correct wire, number of turns and shape in accordance with workplace procedures and work instructions |
| | 2.7 | Work is completed in accordance with timeframe, environment and workplace procedures |
| 3 Complete work report | 3.1 | WHS/OHS work completion risk control measures and workplace procedures are followed |
| | 3.2 | Work report and 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.

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| Dismantling and winding stators must include at least two of the following: | <ul style="list-style-type: none"> • three phase induction machines rated for HV above 3.3 kV |
| Hazard and risk control measures must include at least the following: | <ul style="list-style-type: none"> • high voltage (HV) hazards • isolating machine/equipment for HV |

Unit Mapping Information

This unit replaces and is equivalent to UEENEEG156A Rewind HV three phase induction machines rated for voltages above 3.3 kV.

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 UEEEL0064 Rewind HV three phase induction machines rated for voltages above 3.3 kV

Modification History

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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 one occasion and include:

- dismantling machine and storing parts securely
- preparing stator for winding
- following winding specifications
- selecting correct coils and insulation
- winding and connecting stator correctly
- assembling machine and preparing for testing
- adhering to quality procedures
- completing work report/forms accurately
- dealing with unplanned events
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including using risk control measures
- following quality procedures, workplace procedures and instructions
- rewinding three phase induction machines, including taking readings
- using tools, equipment and testing devices.

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:

- high voltage (HV) three phase motor winding techniques rated above 3.3 kilovolt (kV), including:
 - HV winding conductors and their applications
 - HV winding wire connection methods encompassing:
 - conductor handling
 - conductor preparation
 - connection mediums
 - insulation types and methods

- critical details and measurements when stripping a stator encompassing:
 - winding types:
 - hairpin wound stator and lap wound stator
 - winding diagram
 - wedges of a radially ventilated machine
 - factors to be considered when selecting cables for a stator
- procedures for checking the condition of a stripped stator in preparation for rewind encompassing:
 - manufacturer specifications
 - sequence of events between the removal of the old winding and the start of rewinding
 - core loss test, the effect this test may have on the core and expected test results
 - methods of overcoming hot spots in a stator core
 - level of insulation required to insulate the steel bracing rings that support the overhang
 - difference between the slot liners and packers of a 6.6 kV machine
- procedures for the fitting of coils to core, wedging and bracing encompassing:
 - significance of the slot portion of coils for machines above 3.3 kV
 - method of inserting the coils of a ribbon winding into slots
 - effects of undue mechanical stress on B stage insulated coils
 - importance of coil pitch and why it is important
 - sequence of events in fitting the first pole pitch group of coils in a lap winding
 - sequence of events in fitting the coils of a concentric winding
 - purpose and location of the excess packing in a slot
 - difference between the wedges for a lap and hairpin winding
 - method of fitting a wedge
 - difference that may be encountered between the wedges for a radial ventilated and the wedges for an axially ventilated machine
 - methods used to brace and strengthen the overhang of a lap winding and a hairpin winding
- procedures for making inter turn and inter coil connections on a hairpin winding and inter coil connections on a lap and bar winding encompassing:
 - sequence of events in making turn to turn connections, and insulating the turns of a lap winding:
 - connection methods, including silver solder or brazing and soft solder
 - sequence of events, from hand forming the coil to final insulation, in making the turn to turn connections in a hairpin winding, using a welded joint
 - sequence of events in making the coil to coil connections in a bar winding
- testing according to Australian, British and International Electrotechnical Commission (IEC) standards:
 - 6.6 kV B stage insulated winding and VPI winding test
- materials, procedures, tests and precautions required during and after the impregnation of completed windings according to Australian, British and IEC standards:

- precautions to be taken when handling and using varnishes and resins
- important features of an oven used to cure large impregnated machines
- application and features of various impregnating materials:
 - water-based varnish, Xylol-based varnish and 100% solids resin
- method of carrying out a gel test on a resin and a viscosity test on a varnish
- typical quality procedures carried out on an impregnating varnish
- procedure and precautions for carrying out a hot dip impregnation, a flood coat impregnation and a VPI impregnation
- tests to be carried out after impregnation and bake on a 6.6 kV B stage insulated winding and a VPI winding
- winding to terminal connections according to Australian, British and IEC standards:
 - criteria for selection of winding to terminal cables:
 - voltage rating, full load current and fault capacity
 - common types of terminal boxes and their structure:
 - phase segregated, phase separated and phase insulated
 - method of making the joint between winding and terminal cables and insulating such a joint
- procedures and precautions to be followed when performing static electrical testing of a completed rewind according to Australian, British and IEC standards encompassing:
 - types and purpose of tests
 - testing safety precautions
 - testing procedures:
 - repetitive surge test, loss tangent test, polarisation index (PI) test, cold resistance test and polarity test
 - interpretation of test results
 - calculation of winding cold resistance and line and phase resistance
- relevant induction machines relevant industry standards
- relevant quality workplace procedures
- relevant job safety assessments or risk mitigation processes
- relevant tools, equipment and materials
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies, procedures and instructions.

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 simulated suitable 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 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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