



Australian Government

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

Release: 1

UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

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 2.0.

Application

This unit involves the skills and knowledge required to solve problems in low voltage (LV) electrical network circuits in a very remote community in the electricity supply industry (ESI).

It includes establishing correct operation of single and multi-phase LV electrical network circuits and solving circuit problems as they apply to servicing, fault-finding and installation work function.

It also includes safe working practices, issues related to fault protection, power factor and multiple earthed neutral (MEN) systems and the use of voltage, current and resistance measuring devices to provide solutions to LV electrical network circuit problems derived from calculated and measured parameters.

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

UEECD0046 Solve problems in single path circuits

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

UETDREL001 Apply environmental requirements

UETDREL004 Operate plant and equipment in the vicinity of live electrical apparatus

UETDREL005 Work safely in the vicinity of live electrical apparatus

UETDRRC006 Perform low voltage electricity network switching in a very remote community

UETDRRC007 Solve problems in electrical network apparatus in a very remote community

Competency Field

Remote Community

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 solve problems in LV electrical network circuits

- 1.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are referred to and confirmed
- 1.2** Work plan is obtained and confirmed in accordance with workplace requirements
- 1.3** Materials required for work are determined and obtained in accordance with work plan and workplace requirements
- 1.4** Plant, tools, equipment, and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order
- 1.5** Hazards are identified, risks assessed and control measures identified and applied
- 1.6** Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements
- 1.7** Work permits are received and signed in accordance with workplace requirements
- 1.8** Worksite is prepared in accordance with the work plan and workplace requirements
- 1.9** Traffic management plan is confirmed as being in place in accordance with workplace requirements

2 Solve problems in LV electrical network circuits

- 2.1** Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored
- 2.2** Lifting, climbing, working at heights and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements

- 2.3 Hazard control measures are monitored in accordance with workplace requirements
- 2.4 Live testing or measuring requirements are determined in accordance with workplace requirements
- 2.5 Electrical network circuits are confirmed as isolated and proved earthed/short circuited in accordance with workplace requirements
- 2.6 Operating parameters of the network electrical circuits are verified in accordance with workplace requirements
- 2.7 Established methodical processes are used to identify electrical network circuit problems from measured and calculated values in accordance with workplace requirements
- 2.8 Electrical network circuit problems are solved without damage to apparatus or circuits to comply with workplace requirements
- 2.9 Earthing/short circuiting equipment is removed, permit signed off and electrical network circuits re-energised in accordance with workplace requirements
- 2.10 Electrical network circuits are tested to determine correct operation in accordance with workplace requirements
- 2.11 Incidents or unplanned events are responded to in accordance with workplace requirements
- 3 **Complete work and documentation**
 - 3.1 Completed work is checked for compliance against the work plan and workplace requirements
 - 3.2 Worksite is rehabilitated, cleaned and made safe in accordance with workplace procedures
 - 3.3 Plant, tools and equipment are cleaned, checked and returned to storage in accordance with workplace requirements
 - 3.4 Surplus materials are returned to storage or disposed of in accordance with workplace requirements
 - 3.5 Incidents or unplanned events are reported in accordance with workplace requirements
 - 3.6 Work records, reports and documentation are completed, 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 equivalent to UETTDRIS33 Solve electrical problems in remote community network systems.

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 UETDRRC008 Solve problems in low voltage electrical network circuits in a very remote community

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 2.0.

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 separate occasions and include:

- applying relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
 - work health and safety (WHS)/occupational health and safety (OHS)
- identifying hazards, assessing risks, identifying, applying and monitoring control measures
- obtaining, inspecting and using relevant personal protective equipment (PPE)
- preparing to enter the workplace, including the use of work permits, clearances and isolation permissions
- confirming network electrical circuits are isolated
- determining the correct operation of the network electrical circuits
- using established methodical processes to solve electrical problems in accordance with workplace requirements, including:
 - choosing correct instruments and ranges for testing and measuring values
 - connecting instruments to measure and calculate values in circuits within the electrical network
- identifying circuit problems, including at least three (3) of the following:
 - high voltage (HV)/low voltage (LV)
 - high resistance
 - low resistance
 - fault current (fuses)
 - kilowatt hour meter faults (no supply, reverse polarity, etc)
 - streetlight faults
- connecting and testing network electrical circuits to determine correct operation
- working from at least one (1) of the following:
 - elevated work platform (EWP)
 - platform
 - ladder

- dealing with an unplanned event on at least (1) one occasion
- completing relevant work records, reporting and documentation.

Knowledge 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 and include knowledge of:

- relevant legislation, regulations, standards, codes of practice and organisational workplace requirements, including:
 - WHS/OHS
 - wiring rules requirements
- hazard, risk assessment and risk control requirements, including potential hazards
- types and application of PPE
- alternating current (a.c.) quantities, including:
 - sine, cosine and tangent ratios of a right-angle triangle
 - Pythagoras theorem to a right-angle triangle
 - use of the cathode ray oscilloscope (CRO) to measure direct current (d.c.) and a.c. voltage levels
 - sinusoidal voltage generated by a single turn coil rotated in uniform magnetic fields
 - terms 'period', 'maximum value', 'peak-to-peak value', 'instantaneous value', 'average value', and 'root-mean-square (r.m.s.) value', in relation to a sinusoidal waveform
 - calculation of the instantaneous value of induced voltage of a generated sinusoidal waveform
 - measurement of instantaneous, peak and peak-to-peak values and the period of a sinusoidal waveform
 - calculation of r.m.s. value and frequency of a sinusoidal waveform from values of peak voltage and period
- phasor diagrams, including:
 - purpose of phasor diagrams
 - 'in-phase', 'out-of-phase', 'phase angle' 'lead' and 'lag'
 - phase angle between two or more alternating quantities from a given sinusoidal waveform diagram
 - convention for representing voltage, current and the reference quantity in a phasor diagram
 - drawing phasor diagrams to show the relationship between two or more a.c. values of voltage and/or current
 - determination of phase relationship between two or more sinusoidal waveforms from a given diagram and measurements
- single element a.c. circuits, including:
 - setting up and connecting a single-source resistive a.c. circuit and taking voltage and current measurements to determine the resistance
 - determining the voltage, current resistances from the measurement of given values of any

two of these qualities

- relationship between voltage drops and current in resistive a.c. circuits
- applications of resistive a.c. circuits
- defining ‘inductive reactance’
- calculation of inductive reactance for a given inductor and the relationship between inductive reactance and frequency
- application of Ohm’s law to determine voltage, current or inductive reactance in a purely inductive a.c. circuit given any two of these quantities
- applications of inductive a.c. circuits
- calculation of capacitive reactance
- application of Ohm’s law to determine voltage, current or capacitive reactance in a purely capacitive a.c. circuit given any two of the quantities
- applications of capacitive a.c. circuits
- impedance a.c. circuits, including:
 - impedance and impedance triangle
 - effects of impedance on the neutral and active conductor
 - determining the impedance, current and voltages for a series a.c. circuit
 - drawing and labelling the impedance triangle for a series resistor–capacitor (RC) circuit
 - capacitive components in power circuits and systems and the effect on the phase relationship between voltage and current
 - drawing the equivalent circuit of a practical inductor
 - inductive components in power circuits and systems and their effect on the phase relationship between voltage and current
- power in an a.c. circuit, including:
 - difference between true power, apparent power and reactive power and the units in which these quantities are measured
 - power triangle to show the relationships between true power, apparent power and reactive power
 - terms: power factor and phase angle
 - methods used to measure single phase power, energy and demand
- power factor improvement, including:
 - effects of low power factor
 - requirements for power factor improvement
 - methods used to improve low power factor of an installation
 - local supply authority and wiring rules requirements regarding the power factor of an installation and power factor improvement equipment
- harmonics effect in a.c. systems, including:
 - term harmonic in relation to the sinusoidal waveform of an a.c. power system
 - sources in a.c. systems that produce harmonics
 - problems that may arise in a.c. circuits as a result of harmonics and how these are overcome

- methods and test equipment used to test for harmonics
- multi-phase systems, including:
 - features of a multiphase system
 - two-phase systems (230 V/460 V)
 - comparison of voltages generated by single and multi-phase alternators
 - reasons for the adoption of three phases for power systems
 - how three phases are generated in a single alternator
 - calculation of root mean square (r.m.s.) value of voltage generated in each phase given the maximum value
 - relationship between the phase voltages generated in a multi-phase alternator and the conventions for identifying each
 - term phase sequence (also referred to as phase rotation)
 - phase sequence of a multi-phase supply
- single phase systems
- three phase star-connections, including:
 - connecting a three phase star-connection load
 - phase relationship between line and phase voltages and line and phase currents of a star-connected system
 - determining the r.m.s. value of line and phase voltage given any one of these quantities
 - determining the r.m.s. value of line and phase current given any one of these quantities
 - terms balanced load and unbalanced load
 - balanced and unbalanced loads in typical power systems
- three phase four wire systems, including:
 - purpose of the neutral conductor in three phase four wire systems
 - the effects of a high impedance in the neutral conductor of a three phase four wire system supplying an unbalanced load where multiple earthed neutral (MEN) earthing is employed
- three phase delta-connections and interconnected systems, including:
 - connecting three phase delta loads
 - phase relationship between line and phase voltages and line and phase currents of a delta-connected system
 - determining the r.m.s. value of line and phase voltage given any one of these quantities
 - determining the r.m.s. value of line and phase current given any one of these quantities
 - limitations and uses of open delta connections
 - loads in typical power systems
 - typical combinations of three phase interconnected systems using star-connections and a delta connection
 - relationship between line and phase voltages and line and phase currents in the typical interconnected systems using star-connections and delta connections
- fault loop impedance, including:
 - term fault loop impedance of an a.c. power system

- measuring fault loop impedance of typical circuits
- procedures for testing fault loop impedance
- safe use of plant, tools and equipment
- application, purpose and types of permits
- events constituting an unplanned event or incident
- procedures for responding to an unplanned event or incident.

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, facilities, equipment and PPE currently used in industry for solving electrical problems in low voltage network circuits in a very remote community
- applicable documentation, including workplace requirements, relevant industry standards, equipment specifications, regulations, codes of practice and operation manuals.

Links

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