



Australian Government

UEECD0042 Solve problems in ELV single path circuits

Release: 1

UEECD0042 Solve problems in ELV single path circuits

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 provide solutions to predictable problems in single path circuits operated at extra-low voltage (ELV) as they apply to energy sector work functions.

It includes working safely; using voltage, current and resistance measuring devices; and providing solutions to predictable circuit problems.

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

Competency Field

Cross Discipline

Unit Sector

Electrotechnology

Elements and Performance Criteria

ELEMENTS

Elements describe the essential outcomes.

1 Prepare to work on ELV single path electrical circuits

PERFORMANCE CRITERIA

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

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|------------|---|
| 1.1 | Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for the relevant work area are identified and applied |
| 1.2 | Hazards are identified, risks are assessed, and control measures and workplace procedures are implemented |

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| | 1.3 | Nature of the circuit/s problem is obtained from relevant documentation or work supervisor to determine the scope of work to be undertaken |
| | 1.4 | Advice is sought from work supervisor to ensure work is coordinated effectively with others |
| | 1.5 | Materials required for the work are identified and accessed in accordance with workplace procedures |
| | 1.6 | Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety in accordance with workplace procedures |
| 2 Solve ELV single path electrical circuits problem | 2.1 | WHS/OHS risk control work measures and procedures are followed |
| | 2.2 | Need to test or measure live electrical work is determined and conducted in accordance with WHS/OHS, workplace and regulatory requirements |
| | 2.3 | Circuits are confirmed as being isolated, as required, in accordance with WHS/OHS, workplace and regulatory requirements |
| | 2.4 | Methodological techniques are used to solve circuit problems using measured and calculated values as they apply to single path, single source circuits in accordance with workplace procedures |
| | 2.5 | Problems are solved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices |
| 3 Complete work and document problem-solving activity | 3.1 | WHS/OHS risk control measures for work completion are followed |
| | 3.2 | Worksite is cleaned and made safe in accordance with workplace procedures |
| | 3.3 | Justification for solutions used to solve circuit problems is documented in accordance with 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 ELV single path circuits must include three of the following types of circuit problems:

- identifying and locating open circuits
- identifying and locating short circuits
- identifying loss of supply

Unit Mapping Information

This unit replaces and is equivalent to UEENEEE103A Solve problems in ELV single path circuits.

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 UEECD0042 Solve problems in ELV single path circuits

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 two separate occasions and include:

- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including:
 - checking tools, materials, equipment and testing devices for correct operation and safety
 - ensuring circuits are isolated
 - testing or measuring on live circuits and operating systems safely
 - using risk control measures
- applying sustainable energy principles and practices
- completing workplace documentation, including documenting problem-solving activities
- identifying and accessing relevant materials
- maintaining a clean work site and equipment
- planning work on extra-low voltage (ELV) single path electrical circuits
- referring to relevant documentation to determine the circuit problem
- solving problems in ELV single path electrical circuits, including:
 - altering an existing circuit to comply with specified operating parameters
 - dealing with unplanned events
 - developing circuits to comply with a specified function and operating parameters
- determining the operating parameters of an existing circuit
- dealing with unplanned events.

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:

- basic electrical concepts, including:
 - electrotechnology industry
 - static and current electricity

- production of electricity by renewable and non-renewable energy sources
- transportation of electricity from the source to the load via the transmission and distribution systems
- utilisation of electricity by the various loads
- basic calculations involving quantity of electricity, velocity and speed with relationship to the generation and transportation of electricity
- basic electrical circuit, including:
 - symbols used to represent an electrical energy source, a load, a switch and a circuit protection device in a circuit diagram
 - purpose of each component in the circuit
 - effects of an open circuit, a closed circuit and a short circuit
 - multiple and sub-multiple units
- effects of electrical current, including:
 - physiological effects of current and the fundamental principles listed in AS/NZS 3000 for protection against this effect
 - basic principles by which electric current can result in the production of heat, the production of magnetic fields, and a chemical reaction
 - typical uses of the effects of current
 - mechanisms by which metals corrode
 - fundamental principles listed in AS/NZS 3000 for protection against the damaging effects of current
- electromotive force (EMF) sources, energy sources and conversion electrical energy, including:
 - basic principles of producing an emf from the interaction of a moving conductor in a magnetic field
 - basic principles of producing an emf from the heating of one junction of a thermocouple
 - basic principles of producing an emf by the application of sun light falling on the surface of photovoltaic (PV) cells
 - basic principles of generating an emf when a mechanical force is applied to a crystal (piezo electric effect)
 - principles of producing an electrical current from primary, secondary and fuel cells
 - input, output, efficiency or losses of electrical systems and machines
 - effect of losses in electrical wiring and machines
 - principle of conservation of energy
- resistors, including:
 - features of fixed and variable resistor types and typical applications
 - identification of fixed and variable resistors
 - various types of fixed resistors used in the electrotechnology industry e.g. wire-wound, carbon film and tapped resistors
 - various types of variable resistors used in the electrotechnology industry e.g. adjustable resistors: potentiometer and rheostat, light dependent resistor (LDR), voltage dependent resistor (VDR), negative temperature dependent resistor (NTC) positive temperature

- dependent resistor (PTC)
- characteristics of temperature, voltage and light dependent resistors and typical applications of each
- power ratings of a resistor
- power loss (heat) occurring in a conductor
- resistance of a colour coded resistor from colour code tables and confirm the value by measurement
- measurement of resistance of a range of variable resistors under varying conditions of light, voltage and temperature conditions
- Ohm's law, including:
 - basic direct current (d.c.) single path circuit
 - voltage and current levels in a basic d.c. single path circuit
 - effects of an open circuit, a closed circuit and a short circuit on a basic d.c. single path relationship between voltage and current from measured values in a simple circuit
 - determining voltage, current and resistance in a circuit given any two of these quantities
 - graphical relationships of voltage, current and resistance
 - relationship between voltage, current and resistance
- electrical power, including:
 - relationship between force, power, work and energy
 - power dissipated in circuit from voltage, current and resistance values
 - power ratings of devices
 - measurement of electrical power in a d.c. circuit
 - effects of power rating of various resistors
- relevant electrical regulations and legislations
- relevant manufacturer specifications
- relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes
- relevant WHS/OHS legislated requirements
- relevant workplace documentation
- relevant workplace policies and procedures
- series circuits, including:
 - circuit diagram of a single source d.c. series circuit
 - identification of the major components of a series circuit: power supply, loads, connecting leads and switch
 - applications where series circuits are used in the electrotechnology industry
 - characteristics of a series circuit - connection of loads, current path, voltage drops, power dissipation and effects of an open circuit in a series circuit
 - the voltage, current and resistances or power dissipated from measured or given values of any two of these quantities
 - relationship between voltage drops and resistance in a simple voltage divider network
 - setting up and connecting a single-source series d.c. circuit

- measurement of resistance, voltage and current values in a single source series circuit
- effect of an open circuit on a series connected circuit
- sustainable energy principles and practices
- techniques to confirm that a circuit is isolated
- techniques to check if tools, equipment and testing devices are operating correctly and safely.

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 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, equipment and personal protective equipment (PPE) currently used in industry
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

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