



Australian Government

Assessment Requirements for UEEEL0028

Conduct compliance and functional verification of electrical apparatus and existing circuits

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Modification History

Release 2. Minor Change. Typographic error in prerequisites corrected.

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 industry standards
- applying relevant work health and safety (WHS)/occupational health and safety (OHS) requirements, including risk control measures
- selecting correct tools and testing equipment
- confirming correct isolation in accordance with workplace procedures, industry and regulatory standards
- completing visual inspection and testing of electrical apparatus and circuits, including:
 - identifying visual non-compliance defects
 - using effective methods for conducting mandatory and optional tests
 - using testing devices
- reporting inspection and recommendations, including:
 - identifying non-compliance and functional defects from test results
 - identifying causes of non-compliance and functional defects
- 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:

- electrical safety, including:
 - safety procedures for working on electrical systems, circuits and apparatus
 - safe working practices as a normal part of carrying out electrical installation work
 - isolation and lockout procedures

- tools and equipment needed to conduct electrical work compliance inspection and testing
- legislated regulations, including:
 - legislation and regulations that require electrical apparatus and existing circuits to be inspected and tested to ensure they are safe
 - the person/bodies responsible for the various aspects of ensuring electrical apparatus and existing circuits are safe
 - results of tests that show an electrical apparatus and existing circuits is safe for connection to the supply
 - results of periodic inspection and tests that show electrical equipment are safe to use
- visual inspection of electrical apparatus and existing circuits for compliance with relevant industry standards, including:
 - protection requirements
 - general condition
 - wiring systems
 - equipment and accessories
 - earthing
- testing electrical apparatus and existing circuits, including:
 - tests to ensure insulation resistance is adequate; earth continuity is such that it will ensure the operation of protection devices under earth fault conditions; polarity of active/s and neutral for final sub-circuits is correct; there is no transposition of earthing and neutral conductors; fault-loop impedance is sufficiently low; residual current device (RCD) use for correct operation and sensitivity
 - functional tests to ensure active/s and neutral for the same circuit are clearly identified with their circuit protection device
 - tests that show all circuits and devices operate as intended
 - tests to determine the fault level at a particular point in an installation
- documentation, including:
 - results of tests conducted on an electrical apparatus and existing circuits comply with requirements and ensure the installation is safe
 - documents of the results of testing electrical apparatus and existing circuits as required by the local supply authority
 - documents of periodic testing and inspection of electrical equipment, including tagging requirements
- effects of electric current, including:
 - physiological effects of current
 - basic principles by which an electric current can produce heat, light, motion and a chemical reaction
- single path practical circuit, including:
 - arrangement of energy source, protection device, switch and load in a circuit
 - the purpose of each component in the circuit
 - consequences of an open circuits, closed circuits and short circuits
- multiple path direct current (d.c.) circuits, including:

- circuit configurations and connection
- relationship between parameter of voltage, current, resistance power dissipation in the whole or any part of the circuit
- safely measuring the parameters for the whole or any part of the circuit
- methods of determining circuit behaviour for variation in any of the parameters from measured and calculated values
- alternating voltage and current generation, phase relationships, energy in an alternating current (a.c.) circuit, including:
 - sinusoidal voltage generation and resulting current
 - the terms period, maximum value, peak-to-peak value, instantaneous value, average value, root-mean-square (r.m.s.) value and frequency
 - three phase generation
 - relationship between the phase voltages generated in a three phase alternator and the conventions for identifying each
 - method of determining the phase sequence or phase rotation of a three phase supply
 - methods of determining power and energy supplied by three phase circuits
- fundamental safety principles of relevant industry standards, including:
 - definition of terms
 - fundamental safety principles of protection against direct and indirect contact with live parts; thermal effects; overcurrent; earth faults; abnormal voltages; spread of fire; mechanical injury and external influences
 - fundamental principles of installation design; selection and installation of equipment; means of compliance (including alterations, additions and repairs) and verification of compliance
- electric motor selection, starting method and overload protection, including:
 - types of motor enclosures suitable for given environmental conditions
 - criteria for selecting motor starters and overload protection
 - types and connection arrangements for direct-on-line and reduced voltage starters
 - thermal, magnetic and thermistor overload protection methods
- protective and functional earthing, including:
 - relevant industry standards requirements
 - purpose of protective and functional earthing
 - parts of the protective earthing systems
 - earthing arrangements, earthing of equipment and equipotential bonding
 - methods of determining the maximum fault-loop impedance for a circuit
 - selection of protective conductor and active conductor sizes for each circuit to ensure earth fault-loop impedance is sufficiently low to operate the circuit protective device
- multiple earth neutral (MEN) system and its application, including:
 - the roles of the protective earthing (PE) and neutral (N) conductors in a consumer's installation and their relationship to the protective earth neutral (PEN) conductor in the electricity distributor system or sub-main to an outbuilding
 - the importance of the MEN link when a fault occurs

- the likely consequences of the absence of the MEN link or high impedance in the PEN conductor when a fault occurs
- the requirements for installation of a MEN link in an installation and an outbuilding
- application of transformers, including:
 - transformers used in distribution and transmission systems and large consumer installations
 - transformers used in welding machines
 - applications in appliances
 - risks and safety control measures associated with connection and disconnection of instrument transformers
 - safe working procedures when connecting and testing transformers
 - relevant industry standards requirements and restriction on the installation and use of transformers
- protection of circuit against overcurrent and abnormal voltages, including:
 - relevant industry standards requirements
 - minimum fault levels specified by electricity distributors
 - methods and arrangement for protection against short-circuit currents and overload currents
 - coordination of overload and short circuit protection devices
 - coordination between conductors and overload protection device
 - causes of over and undervoltage
 - device and requirements for protection against over and undervoltage
- use of RCDs and extra-low voltage (ELV) for fault protection, including:
 - limitation of an RCD to protect against contact with live parts
 - relevant industry standards requirements for use of RCDs
 - conditions for use of ELV to provide for basic and fault protection
 - relevant industry standards requirements for installation of separated extra-low voltage (SELV) and protected extra-low voltage (PELV) systems
- control and protection of electrical apparatus and existing circuits, including:
 - relevant industry standards requirements
 - devices for functions of isolation, emergency, mechanical maintenance and functional control
 - method for assessing prospective short circuit current
 - devices and arrangement for protection against overload and short circuit current
 - additional protection by RCD
 - protection against switchboard internal arc faults
- electrical apparatus and existing circuits in hazardous areas, including:
 - relevant industry standards requirements
 - types of areas classified as a hazardous area
 - standards to which the maintenance of electrical equipment shall comply
 - additional training required to work competently with electrical equipment for hazardous

areas

- verification of compliance of electrical apparatus and existing circuits, including:
 - relevant industry standards requirements
 - visual inspection to determine if electrical apparatus and existing circuits complies with requirements of relevant industry standards and relevant specific installation standards
 - mandatory tests in AS/NZS 3017 Electrical installations - Verification guidelines
 - portable tool safety testing and tagging system in accordance with AS/NZS 3760 In-service safety inspection and testing of electrical equipment
- ability to perform effective safe isolation of any equipment, including:
 - preparation of a safe work method statement (SWMS) or job safety analysis (JSA) for effective safe isolation
 - safe methods for identifying source of supply to be isolated
 - switching-off, lock-out and tagging procedures
 - safe methods for confirming effective and safe isolation
- relevant industry standards requirements to carryout repairs and terminating thermoplastic insulated cables, elastomer sheathed cables, cross-linked polyethylene (XLPE) sheathed cables, high temperature cables, armoured cables and neutral screened cables in a wide range of applications
- circuit tests required for electrical cables in a range of installations and final sub-circuit, including:
 - following safe testing procedures
 - tests to show if the earth continuity and earth fault-loop impedance are sufficiently low
 - testing to show if insulation resistance is sufficiently high
 - testing to show if the polarity and circuit connections are correct
- techniques to read, sketch and interpret electrical diagrams including:
 - purpose and characteristics of schematic, block and wiring diagrams, plans and schedules
 - conventions used in documenting electrical information
 - read and interpret schematic, block and wiring diagrams, plans and schedules
 - sketch electrical diagrams using conventional symbols
- WHS/OHS, including:
 - WHS/OHS regulations
 - legal responsibilities for employers and employees
 - employer's and employee's own duty of care
 - safety committees and their role
- requirements for personal safety in the workplace including:
 - purpose and use of SWMS or JSA
 - purpose and process of reporting WHS/OHS incidents
 - safety procedures for working with electrical circuits and equipment
 - procedures for safe and effective isolation of electrical supply
 - regulations for the supervision of apprentices and trainees
- process to rescue a person in contact with live electrical conductors or equipment and the

- primary importance of the safety of the rescuer
- application of emergency first aid requirements for an electric shock victim, including:
 - calling for help
 - applying cardiopulmonary resuscitation (CPR)
 - selection and use of fire extinguishers to control electrical fire at accident site
- dangers of high voltage (HV) equipment and distribution systems, including:
 - step and touch and induced voltages
 - sources of induced voltage and stored energy
 - creepage and clearance requirements
 - application of safe working procedures in the vicinity of HV equipment
- systematic method of commissioning and decommissioning electrical equipment and existing circuits, including:
 - commissioning safety procedures
 - circuit voltage testing
 - phase rotation checks
 - functional testing
 - instrument and control parameter settings
 - decommissioning safety procedures
 - identification of circuits with their control and protection devices
 - impact of isolation on other parts of an installation
 - tagging, testing and earthing
 - safe removal of equipment
- diagnosing and rectifying faults in electrical apparatus and existing circuits, including:
 - faults such as open circuit, short circuit, incorrect connections, insulation failure, unsafe condition, apparatus/component failure and related mechanical failure
 - apparatus such as control devices, fixed appliances/accessories, lighting, electrical machines motors and controls, socket outlets, transformers, protection and metering devices
 - circuits such as those supplying fixed appliances, lighting, socket outlets, motors and controls circuits, transformers, electronic or computer-based equipment.

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.

Links

Companion Volume implementation guides are found in VETNet - -

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