



Australian Government

MEM10024 Install and troubleshoot luminaires and ancillary equipment

Release: 3

MEM10024 Install and troubleshoot luminaires and ancillary equipment

Modification History

Release 3. Prerequisite units updated

Release 2. Minor adjustments to reflect ERAC requirements for electrician licensing and revision of Essential Performance Capabilities

Release 1. New unit

Application

This unit of competency has been developed for Engineering Tradesperson – industrial electrician apprenticeship training and the recognition of trade-level skills in installing and troubleshooting luminaires and ancillary equipment in accordance with the relevant standards.

It covers a basic understanding of the various types of faults, luminaires and the purpose components and ancillary equipment for operating voltages up to 1000 V alternating current (AC) or 1500 V direct current (DC) and related hazard and safety requirements.

This unit covers the skills and knowledge required to meet the Electrical Regulatory Authorities Council (ERAC).

Essential Performance Capability (EPC):

- EPC 53 – Demonstrate an understanding of the basic operation and energy efficiency of the various types of luminaires and the purpose of components and ancillary equipment including related hazards and their safety requirements.

Some jurisdictions require the holder of this unit to be licensed or certified and users should check with the relevant authorities.

Band: A

Unit Weight: 2

Pre-requisite Unit

MEM10016	Terminate and test electrical wiring and accessories
MEM10018	Select cable types and sizes to suit loads and electrical installation environment
MEM10019	Select circuit protection devices by type and rating, fit to switchboards and install earthing
MEM10023	Design and connect control switching of circuits for building services and industrial equipment

MEM18001 Use hand tools

Competency Field

Installation and commissioning

Elements and Performance Criteria

Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Determine job requirements	1.1. Follow standard operating procedures (SOPs) 1.2. Comply with work health and safety (WHS) requirements at all times, including appropriate risk control measures 1.3. Use appropriate personal protective equipment (PPE) in accordance with SOPs 1.4. Determine through the interpretation of electrical diagrams, drawings, lighting standards and/or from consultation the luminaire and ancillary equipment requirements for the electrical installation
2. Install luminaires and ancillary equipment	2.1. Obtain the number and type of luminaires and associated ancillary equipment through established procedures 2.2. Obtain necessary tools, equipment and testing instruments needed for installing luminaires and ancillary equipment 2.3. Isolate and tag circuits and equipment in accordance with procedures, where required 2.4. Install luminaires and accessories complying with job specifications, and regulatory and legislative requirements 2.5. Check installed accessories are straight and square in the required locations and within acceptable tolerances 2.6. Terminate lighting circuits to luminaires, switches and other control devices in accordance with manufacturer

Elements describe the essential outcomes.

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

specifications and regulatory requirements

2.7. Test luminaires and ancillary equipment to ensure compliance

3. Troubleshoot luminaires and ancillary equipment

3.1. Identify the fault and resulting safety hazards and implement risk control measures in consultation with appropriate personnel

3.2. Apply diagnostic techniques to troubleshoot luminaires, ancillary equipment and associated lighting circuits using appropriate test equipment

3.3. Repair/replace faulty circuits/components according to manufacturer specifications and regulatory requirements

3.4. Test repaired/replaced circuit/component for functionality in accordance with regulatory requirements

3.5. Dispose of discharge lamps in accordance with environmental guidelines and procedures

3.6. Document installation and troubleshooting of luminaires, ancillary equipment and associated circuits in accordance with SOPs

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

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

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Lighting standard includes:

- AS/NZS 1680.1:2006 Interior and workplace lighting general principles and recommendations

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Regulatory requirements include:

- AS/NZS 3000:2007 Electrical Installations (known as the Australian/New Zealand Wiring Rules)
- National Construction Code (NCC) Australia or building code (NZ)

Faults include:

- fluorescent light circuits, including lamp, ballast and starter
- metal Halide and high-pressure sodium (HPS) lighting and circuits, including capacitor, poor connection, igniter and ballast
- extra-low voltage (ELV) lighting devices, including transformer (iron core or electronic), voltage drop, heat, over-voltage, poor connections and incompatible dimmers
- lighting control circuits, including manual control, passive infra-red (PIR), dimmers, photo electric or day-light switches and time clocks
- lighting management systems

Lighting circuits include two (2) or more of the following:

- single light controlled by a single switch
- multiple lights controlled by a single switch
- two and three-way switching using:
 - loop at the light method
 - loop at the switch method

Safe working practices include:

- demonstration of safe working practices and installation in accordance with industry established safe and sound practices

Unit Mapping Information

Release 2. Equivalent. Minor adjustments to reflect ERAC requirements for electrician licensing and revision of Essential Performance Capabilities.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM10024 Install and troubleshoot luminaires and ancillary equipment

Modification History

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Release 1. New unit

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting circuits, drawings, specifications and plans relevant to the work to be undertaken
- determining the electrical and non-electrical isolation requirements to prevent the creation of hazards linked from the loss of machine/system/process control according to established procedures
- using lock out tag procedures with appropriate tags/signs
- proving electrical isolation and following established safety rules prior to working on electrical equipment or wiring
- ensuring all electrical equipment and tools are tested and tagged and up to date
- installing accessories ensuring that they are straight and square in the required location
- using safe working practices and take additional care when working with lights that operate at high voltage or contain capacitors
- terminating two (2) or more of the following lighting circuits:
 - single light controlled by a single switch
 - multiple lights controlled by a single switch
 - two and three-way switching using:
 - loop at the light method
 - loop at the switch method
- complying with the Australian/New Zealand Wiring Rules requirements for the installation and termination of lighting equipment and accessories, including related hazards and safety requirements including maintaining fire integrity
- measuring and recording illumination for comparison against lighting standard AS/NZS 1680.1:2006 Interior and workplace lighting – General principles and recommendations, using a suitable light meter
- locating and repairing faults in luminaires and ancillary equipment

- troubleshooting and repairing faults in common lighting circuits
- replacing lamps with 'like for like'
- performing periodic servicing of emergency lighting and smoke detector systems and recording intervals of servicing, including remedial action taken
- disposing of discharge lamps according to environmental guidelines and established procedures
- documenting installation and troubleshooting, including remedial action taken in accordance with SOPs.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- lighting applications, including:
 - basic principles, terminology and units in describing process and concepts of illumination
 - the major design requirements of luminaires regarding reflection or diffusion of light and direct the light onto the working place
 - functional category types of luminaires:
 - direct with 90-100% downward light component
 - indirect with 90-100% upward light component
 - general diffusing with approximately equal upward and downward components
 - semi direct with 10-40% upward and 60-90% downward
 - semi direct with 60-90% upward and 10-40% downward
 - maintenance of luminaires, including lamp replacement and cleaning
 - common faults in luminaires
 - disposal of discharge lamps in accordance with environmental guidelines and established procedures
 - elementary lighting design, including:
 - requirements to clearly show up the task or work area
 - recommended maintenance luminance
 - the advantages of the use of reflectors and diffusers
 - determining illuminance on a working plane using the 'point by point' method and lumen method
 - the use of a lux meter to determine lighting and illumination requirements
 - emergency evacuation lighting in buildings, including:
 - escape and standby lighting
 - installation requirements of emergency lighting luminaires
 - installation of smoke detection in domestic and residential premises
 - inspection and maintenance of emergency lighting and smoke detectors
 - recording requirements

- light sources, including:
 - lamp type and their characteristics
 - the operating principles of various types of lamps and luminaires and the purpose of their auxiliary control equipment
 - energy efficiency
 - the cause of low power factor and the measures used to improve power factor in discharge lighting
 - Australian/New Zealand Wiring Rules requirements for the installation of lighting equipment and accessories, including related hazards and safety requirements
 - application of various types of lamps and luminaires
 - ‘stroboscopic effect’ and the methods used to overcome, including:
 - ‘non-stroboscopic’ circuit (inclusion of a capacitor in one fluorescent lamp circuit to provide phase shift in relation to the other lamp circuit)
 - connecting adjacent lamps to different phases in large installations
 - electronic lamp circuits operating at high frequencies
- lighting circuits, including:
 - single light controlled by a single switch
 - multiple lights controlled by a single switch
 - two and three-way switching using the loop at the light method and the loop at the switch method
- lighting control, including:
 - manual control involving the use of two-way and intermediate switches
 - time switches both analogue and digital for programmed control
 - time delay switches that are adjustable and may be air-valve or electronic type
 - photo-sensitive electronic control used to control outdoor and street lighting
 - passive infrared (PIR) technology used in scanning devices to detect movement of a hot or cold body and automatically switch on security or convenience lighting
 - various types light dimmers, including electronic
 - lighting management systems, e.g. C-Bus.

Assessment Conditions

- Assessors must:
 - have vocational competency in installing and troubleshooting luminaires and ancillary equipment at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* and comply with the *National Vocational Education and Training Regulator Act 2011* or equivalent legislation covering VET regulation in a non-referring State as the case requires.

- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- 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.

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