

# **22324VIC Certificate IV in Electrical Inspection**

**Version 1.1**

This course has been accredited under Parts 4.4 of the Education and Training Reform Act 2006.

**Accredited for the period: 1 January 2017 to 31 December 2021**

**22324VIC accreditation extended to: 31 December 2022**





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## 22324VIC Certificate IV in Electrical Inspection

### Modification History

Version	Date	Details
1.1	September 2021	Course accreditation extended to 31 December 2022.
1.0	December 2015	Initial release approved to commence from 1 January 2017

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## Section A: Copyright and Course Classification Information

<b>1. Copyright owner of the course</b>	<p>Copyright of this course is held by the Department of Education and Training, Victoria © State of Victoria.</p>
<b>2. Address</b>	<p>Executive Director Industry Engagement and VET Systems Higher Education and Skills Group Department of Education and Training (DET) GPO Box 4367 Melbourne Vic 3001</p> <p><b><u>Organisational Contact:</u></b> Manager Training Products Higher Education and Skills Group Telephone: 131823</p> <p><b><u>Day-to-Day Contact</u></b> Curriculum Maintenance Manager-Engineering Industries Box Hill Institute of TAFE Private Bag 2014 Box Hill, Victoria 3128 Ph: 03 9286 9880 Email: <a href="mailto:gadda@bhtafe.edu.au">gadda@bhtafe.edu.au</a></p>
<b>3. Type of submission</b>	<p>Re-accreditation</p>
<b>4. Copyright acknowledgement</b>	<p>Copyright of this material is reserved to the Crown in the right of the State of Victoria. © State of Victoria (Department of Education and Training) 2016.</p> <p>The unit of competency: BSBSMB405 Monitor and manage small business operations is from the BSB Business Services Training Package administered by the Commonwealth of Australia. © Commonwealth of Australia</p> <p>The unit of competency: CPCCWHS1001 Prepare to work safely in the construction industry is from the CPC Construction, Plumbing and Services Training Package administered by the Commonwealth of Australia. © Commonwealth of Australia</p> <p>The unit of competency: UEENEEC010B Deliver a service to customers is from the UEE11 Electrotechnology Training Package administered by the Commonwealth of Australia.</p>



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<b>6. Course accrediting body</b>	<b>Victorian Registration and Qualifications Authority (VRQA)</b>
<b>7. AVETMISS information</b>	<p><b>ANZSCO code:</b> 312611 Safety Inspector</p> <p><b>ASCED Code:</b> 0313 Electrical and Electronic Engineering and Technology</p> <p><b>National course code:</b> 22324VIC</p>
<b>8. Accreditation period</b>	1 January 2017 to 31 December 2021 Extended to: <b>31 December 2022</b>



## Section B: Course Information

<b>1 Nomenclature</b> <i>Standard 1 AQTF Standards for Accredited Courses</i>	
<b>1.1 Name of the qualification</b>	Certificate IV in Electrical Inspection
<b>1.2 Nominal duration of the course</b>	355-360 hours (Licence Class G – General) 355-360 plus 120 hours (Licence Class H – Harzardous Areas) 355-360 plus 100 hours (Licence Class V – High Voltage Installation) 355-360 plus 80 hours (Licence Class M – Medical Installation)
<b>2 Vocational or educational outcomes</b> <i>Standard 1 AQTF Standards for Accredited Courses</i>	
<b>2 Purpose of the course</b>	<p>This course is aimed at licensed electrical trades people and professional electrical engineers to provide them with the knowledge and skills required to inspect and assess a variety of electrical installations for compliance with the regulator’s requirements.</p> <p>This course is not intended to prepare individuals to undertake licensed electrical installation work.</p> <p>It must be noted that ESV requires direct application by individuals for the different classes of electrical inspection licenses, specifies additional mentoring work and ESV assessment requirements before the licence may be granted. Full details are available on <a href="http://www.esv.vic.gov.au">www.esv.vic.gov.au</a>.</p>
<b>3 Development of the course</b> <i>Standards 1 and 2 AQTF Standards for Accredited Courses</i>	
<b>3.1 Industry /enterprise/ community needs</b>	<p>The Certificate IV in Electrical Inspection is designed to meet the training needs of persons wishing to make application to Energy Safe Victoria (ESV) for licensing as electrical inspectors. ESV treats each application on a case by case basis and may require substantiation of work experience in addition to formal training qualifications.</p> <p>A qualification to meet the needs of training electrical inspectors has been in existence since the deregulation of the Victorian electricity industry and was first accredited as the Certificate IV in Electrical (Electrical Installation Inspection) in 2000. It was re- developed in 2005 and accredited as the Certificate IV in Electrical Inspection. This was re-accredited in July 2011. It is now being presented for re-accreditation to meet the changing needs of the industry and the new licence classes established by ESV.</p>



Electrical inspectors represent an aging population and ESV estimates that it will need to license at least 40-50 new inspectors annually to replace current inspectors as they retire.

The proposed course provides the skills and knowledge for licensed electrical trades people and professional electrical engineers intending to become licensed electrical installation inspectors in Victoria, to be assessed for a particular class of electrical inspection licence in accordance with ESV's requirements.

The following licence classes are addressed by this course.

- Class G (General)
- Class H (Hazardous Areas)
- Class V (High Voltage Installation)
- Class M (Medical Installations)

There is a UEE40311 Certificate IV in Installation Inspection and Audits qualification within the UEE11 Electrotechnology Training Package, but it does not meet Energy Safe Victoria's requirements, although some endorsed units partially satisfy particular aspects of licencing.

It is anticipated that enrolments in the course will average approximately 40 - 50 learners annually. Given the on-going demand for electrical inspectors and the increasing age of existing inspectors, it is expected enrolments will be maintained at this level.

The membership of the PSC was as follows:

Sue Sizer	Energy Safe Victoria
Maurice Graham	Electrical Trades Union (ETU)
Stuart McIntosh	Institute of Electrical Inspectors
Alex Newman	Holmesglen Institute
Roy Sands	National Electrical and Communications Association (NECA)

In attendance:

George Adda	CMM-Engineering Industries
Sam McCurdy	Dewhurst Consultancy Pty Ltd

The proposed Certificate IV in Electrical Inspection is not covered by a suitable qualification within a Training Package. It:

- does not duplicate, by title or coverage, the outcomes of an endorsed training package qualification;
- is not a subset of a single training package qualification that could be recognised through one or more statements of attainment, or a skill set;
- does not include units of competency additional to those in a training package qualification that could be recognised through statements of attainment in addition to the qualification;

does not comprise units that duplicate units of competency of a training package qualification.



<p><b>3.2 Review for re-accreditation</b></p>	<p>The re-accreditation methodology for this course involved:</p> <ul style="list-style-type: none"> <li>• A review of all available training packages and existing course documentation;</li> <li>• A review of Energy Safe Victoria's requirements for electrical inspectors;</li> <li>• A survey of the industry to confirm the skills and knowledge requirements for an electrical inspector;</li> <li>• The drafting of a qualification outline in consultation with Energy Safe Victoria;</li> <li>• Consideration of the draft qualification by an industry based steering committee;</li> <li>• Circulation of qualification structure to the wider industry for comment;</li> <li>• Refinement of the course documents;</li> <li>• Ratification of the course structure and content by the Project Steering Committee (PSC).</li> </ul> <p>22324VIC Certificate IV in Electrical Inspection is not equivalent to 22171VIC Certificate IV in Electrical Inspection.</p> <p>Transition arrangements for the course are provided in <b>Table 1</b>.</p>
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<b>Table 1: Transition Arrangements for 22324VIC</b>				
<b>22171VIC Certificate IV in Electrical Inspection</b>		<b>22324VIC Certificate IV in Electrical Inspection</b>		<b>Comments</b>
<b>Unit code</b>	<b>Unit Title</b>	<b>Unit code</b>	<b>Unit Title</b>	
<b>Core:</b>				
VU20767	Verify low voltage electrical wiring, equipment & accessories	VU21939	Apply fundamental principles in the design and installation of electrical installations	Equivalent
VU20661	Inspect and test general electrical installations			
VU20768	Identify faults in electrical apparatus and circuits			
VU20663	Inspect, test and administer low voltage installations	VU21940	Inspect, test and administer electrical installations	Equivalent
VU20665	Inspect, test and administer complex electrical installations			



VU20664	Inspect, test and administer alternative power systems	VU21941	Inspect and test electricity generation systems	Not Equivalent unit
		VU21938	Work within the context of an electrical inspector	No equivalent unit
		VU21942	Inspect and test heavy current switchboards ( $\geq 800$ Amps) and associated switchgear and control gear	No equivalent unit
		VU21943	Investigate incidents of minor electric shock	No equivalent unit
<b>Electives:</b>				
		VU21944	Apply the "Victorian Service & Installation Rules" to inspection of electrical installations	No equivalent unit
		BSBSMB405	Monitor and manage small business operations	No equivalent unit
		CPCCWHS1001	Prepare to work safely in the construction industry	No equivalent unit
VU20666	Produce electrical inspection reports	VU21945	Produce electrical inspection reports	Equivalent
UEENEEC010B	Deliver a service to customers	UEENEEC010B	Deliver a service to customers	Same unit
VBP455	Inspect, test and administer hazardous electrical installations	VU21946	Inspect, test and administer hazardous electrical installations	Equivalent
VBP457	Inspect, test and administer high voltage installations	VU21947	Inspect, test and administer high voltage installations	Equivalent
VBP460	Inspect, test and administer medical installations	VU21948	Inspect, test and administer medical installations	Equivalent

4. Course outcomes	<i>Standards 1, 2, 3 and 4 AQTF Standards for Accredited Courses</i>
<b>4.1 Qualification level</b>	<p><i>Standards 1, 2 and 3 AQTF Standards for Accredited Courses</i></p> <p>The course is correctly placed at a Certificate IV level in the Australian Qualifications Framework (AQF) in that graduates will be able to:</p> <ul style="list-style-type: none"> <li>• applying relevant Australian standards, codes of practice, regulator’s requirements and industry guidelines based on a broad knowledge base</li> <li>• applying solutions to a defined range of unpredictable problems by methodically verifying compliance of all aspects of electrical installations with all relevant regulatory requirements</li> <li>• identifying and applying skill and knowledge areas to a range of situations, while performing electrical inspections in a wide variety of contexts</li> <li>• evaluating information from a variety of sources and analysing the data gathered during an electrical inspection to assess compliance with regulatory requirements</li> <li>• taking responsibility for own outputs in relation to specified quality standards by meeting regulator’s reporting standards and being accountable for the findings of that report.</li> </ul> <p>The Volume of Learning for the Certificate IV in Electrical Inspection is typically 0.5 - 2 years. This incorporates structured training delivery and opportunities for practice and reinforcement of skills including: self-directed study, research and written assignments.</p>
<b>4.2 Employability skills</b>	<p><i>Standard 4 AQTF Standards for Accredited Courses</i></p> <p>The Employability Skills for the Certificate IV in Electrical Inspection are summarised in <b>Table 2</b>.</p> <p>Note: <b>Table 2</b> contains a summary of the employability skills for this course. This table should be interpreted in conjunction with the detailed requirements of each unit of competency packaged in this course. The outcomes described here are broad industry requirements.</p>



**Table 2: Summary of the Employability Skills for the Certificate IV in Electrical Inspection**

Employability Skills	Industry/enterprise requirements for this qualification include the following facets. On successful completion of the course a graduate should be able to:
Communication	<ul style="list-style-type: none"> <li>• Listen to and interpret verbal information</li> <li>• Read and interpret relevant regulations, signs, labels and other relevant workplace documents associated with inspection and testing</li> <li>• Write reports as part of the inspection and testing requirements and investigations</li> <li>• Negotiate complex issues with others</li> <li>• Speak clearly and directly on complex matters, when sharing data, requirements or other information relevant to inspection and testing outcomes</li> </ul>
Teamwork	<ul style="list-style-type: none"> <li>• Provide leadership during testing activities as appropriate</li> <li>• Collaborate with others</li> <li>• Work with diverse range of people and as part of a team</li> </ul>
Problem solving	<ul style="list-style-type: none"> <li>• Identify and solve or report complex problems</li> <li>• Monitor and anticipate problems that may occur including hazards and risks and take appropriate action</li> <li>• Respond to hazards and risks in a range of complex and diverse situations</li> <li>• Resolve client concerns in relation to complex issues</li> <li>• Monitor and anticipate problems that may occur in the course of inspection and testing activities</li> </ul>
Initiative and enterprise	<ul style="list-style-type: none"> <li>• Modify activities dependent on different situations</li> <li>• Respond appropriately to changes in equipment, standard operation procedures and the working environment</li> <li>• Take appropriate initiatives in a diverse range of inspection and testing situations</li> </ul>
Planning and organising	<ul style="list-style-type: none"> <li>• Implement emergency plans, systems and procedures</li> <li>• Implement procedures for maintaining compliance with regulations and other relevant work requirements</li> <li>• Collect and interpret information needed when undertaking inspection and testing</li> <li>• Organise and plan own activities</li> <li>• <u>Manage time priorities</u></li> </ul>
Self-management	<ul style="list-style-type: none"> <li>• Interpret and apply relevant regulations</li> <li>• Establish and follow own work plans and schedules</li> <li>• Evaluate and monitor own work performance</li> </ul>
Learning	<ul style="list-style-type: none"> <li>• Adapt own competence in response to change</li> <li>• Update own knowledge and skills required for inspection and testing</li> </ul>
Technology	<ul style="list-style-type: none"> <li>• Use testing equipment and systems as required</li> <li>• Use computers and printers to prepare reports</li> <li>• Implement and monitor the application of OH&amp;S procedures</li> </ul>



<b>4.3 Recognition given to the course</b>	<p><i>Standard 5 AQTF Standards for Accredited Courses</i></p> <p>Not applicable</p>												
<b>4.4 Licensing/ regulatory requirements</b>	<p><i>Standard 5 AQTF Standards for Accredited Courses</i></p> <p>The course develops the skills/knowledge required to prepare licence applicants to meet Energy Safe Victoria (ESV) requirements for licensed electrical inspectors.</p> <p><b>Table 3</b> below shows the relationship between the classes of electrical inspection licenses and the units of competency of the course.</p> <table border="1" data-bbox="533 595 1469 1274"> <thead> <tr> <th colspan="2" data-bbox="533 595 1469 663"><b>Table 3: Classes of electrical inspection licenses</b></th> </tr> <tr> <th data-bbox="533 663 842 734"><b>Class</b></th> <th data-bbox="842 663 1469 734"><b>Units</b></th> </tr> </thead> <tbody> <tr> <td data-bbox="533 734 842 853">Class G (General)</td> <td data-bbox="842 734 1469 853">All Core units plus general electives making up a minimum of 40 hours</td> </tr> <tr> <td data-bbox="533 853 842 987">Class H (Hazardous Areas)</td> <td data-bbox="842 853 1469 987">All Class G (General) units requirements plus VU21946 Inspect, test and administer hazardous electrical installations</td> </tr> <tr> <td data-bbox="533 987 842 1122">Class V (High Voltage Installation)</td> <td data-bbox="842 987 1469 1122">All Class G (General) units requirements plus VU21947 Inspect, test and administer high voltage installations</td> </tr> <tr> <td data-bbox="533 1122 842 1274">Class M (Medical Installations)</td> <td data-bbox="842 1122 1469 1274">All Class G (General) units requirements plus VU21948 Inspect, test and administer medical installations</td> </tr> </tbody> </table> <p>It must be noted that ESV requires direct application by individuals for the different classes of electrical inspection licenses, specifies additional mentoring work and ESV assessment requirements before the licence may be granted. Full details are available on <a href="http://www.esv.vic.gov.au">www.esv.vic.gov.au</a>.</p>	<b>Table 3: Classes of electrical inspection licenses</b>		<b>Class</b>	<b>Units</b>	Class G (General)	All Core units plus general electives making up a minimum of 40 hours	Class H (Hazardous Areas)	All Class G (General) units requirements plus VU21946 Inspect, test and administer hazardous electrical installations	Class V (High Voltage Installation)	All Class G (General) units requirements plus VU21947 Inspect, test and administer high voltage installations	Class M (Medical Installations)	All Class G (General) units requirements plus VU21948 Inspect, test and administer medical installations
<b>Table 3: Classes of electrical inspection licenses</b>													
<b>Class</b>	<b>Units</b>												
Class G (General)	All Core units plus general electives making up a minimum of 40 hours												
Class H (Hazardous Areas)	All Class G (General) units requirements plus VU21946 Inspect, test and administer hazardous electrical installations												
Class V (High Voltage Installation)	All Class G (General) units requirements plus VU21947 Inspect, test and administer high voltage installations												
Class M (Medical Installations)	All Class G (General) units requirements plus VU21948 Inspect, test and administer medical installations												

## 5. Course rules Standards 2, 6,7 and 9 AQTF Standards for Accredited Courses

### 5.1 Course structure

To be awarded the Certificate IV in Electrical Inspection participants must successfully complete six (6) core units, plus general electives making up a minimum of 40 hours from those listed below. This arrangement meets the requirements for ESV Licence Class G – General.

Elective units may only be imported from an accredited course/s or endorsed training package/s, if they are consistent with the vocational outcomes of this qualification and do not duplicate the outcomes of the core units.

Participants who do not complete all the requirements for the course will be issued with a Statement of Attainment listing the unit(s) attained.

To meet the requirements of class H, V and M licence, one of the following corresponding units must be completed in addition to the ESV Licence Class G –General requirement:

- Class H (Hazardous Areas) – VU21946 Inspect, test and administer electrical hazardous installations
- Class V (High Voltage Areas) – VU21947 Inspect, test and administer high voltage installations
- Class M (Medical Installations) – VU21948 Inspect, test and administer medical installations

A Statement of Attainment will be issued for each **Specialist unit** when completed.

**Note:** The Specialist electives can only be undertaken after a “G” Class Electrical Inspection license has been issued and validated by ESV.

**OR**

After the G Class core and elective units have been successfully completed.

Refer to **Table 4** for details of the course structure and nominal duration of units in hours.

**Table 4: Course structure and nominal duration of units**

Unit code	Field of Education code (six-digit)	Unit Title	Pre-requisite	Nominal hours
<b>Core units</b>				
VU21938	031301	Work within the context of an electrical inspector	NI	15
VU21939	031301	Apply fundamental principles in the design and installation of electrical installations	NI	80
VU21940	031301	Inspect, test and administer electrical installations	VU21939	100

VU21941	031301	Inspect and test electricity generation systems	Nil	60
VU21942	031301	Inspect and test heavy current ( $\geq 800$ Amps) and associated switchgear and control gear	Nil	40
VU21943	031301	Investigate incidents of minor electric shock	Nil	20
<b>Total core unit hours</b>				<b>315</b>
<b>General Electives: (Select general electives to make up a minimum of 40 hours)</b>				
BSBSMB405	080301	Monitor and manage small business operations	Nil	45
CPCCWHS1001	030901	Prepare to work safely in the construction industry	Nil	6
UEENEEC010B	031399	Deliver a service to customers	Nil	20
VU21944	031301	Apply the "Victorian Service & Installation Rules" to inspection of electrical installations	Nil	20
VU21945	031301	Produce electrical inspection reports	Nil	20
<b>Minimum hours of electives</b>				<b>40</b>
<b>Total nominal hours for the course</b>				<b>355 - 360</b>
<b>Specialist Electives (These units are for Electrical Inspection Licence Class H, V &amp; M)</b>				
VU21946	031301	Inspect, test and administer hazardous electrical installations	Nil	120
VU21947	031301	Inspect, test and administer high voltage installations	Nil	100
VU21948	031301	Inspect, test and administer medical installations	Nil	80
<p><b>Note:</b> The Specialist electives can only be undertaken after a "G" Class Electrical Inspection license has been issued and validated by ESV.</p> <p style="text-align: center;"><b>OR</b></p> <p style="text-align: center;">After the G Class core and elective units have been successfully completed.</p>				
<b>5.2 Entry requirements</b>		<i>Standard 9 AQTF Standards for Accredited Courses</i>		

	<p>Entry to this course is open to:</p> <ul style="list-style-type: none"> <li>• Holders of a current Australian unrestricted AClass electrician's license;</li> <li>• Graduate engineers who have completed an Australia accredited or recognised Australian tertiary qualification in electrical or medical engineering;</li> </ul> <p>Industry have determined that possession of an "A" Grade Electrical license is insufficient for claiming RPL for the unit <i>VU21939 Apply fundamental principles in the design and installation of electrical installations</i></p> <p>Although not a requirement for entry to the course, applicants should be advised of the work requirements mandated by ESV for licensing of electrical inspectors.</p> <p>It is recommended that participants have learning, literacy, numeracy and oral communication skills equivalent to Australian Core Skills Framework (ACSF) Level 4.</p> <p>Students may enter below this level at the discretion of the RTO. Learners who have lower levels of language and literacy may require additional support to complete the course.</p>
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<b>6. Assessment</b>	<b>Standards 10 and 12 AQTF Standards for Accredited Courses</b>
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<b>6.1 Assessment strategy</b>	<p>All assessment, including Recognition of Prior Learning (RPL) must be compliant with:</p> <ul style="list-style-type: none"> <li>• Standard 1, Element 1.5 of the Australian Quality Training Framework (AQTF): <i>Essential Conditions and Standards for Continuing Registration or;</i></li> <li>• Standard 1 of the <i>Standards for Registered Training Organisations (RTOs) 2015, or;</i></li> <li>• The relevant Standards for Registered Training Organisations in effect at the time of assessment.</li> </ul> <p>Assessment strategies must therefore ensure that:</p> <ul style="list-style-type: none"> <li>• all assessments are valid, reliable, flexible and fair;</li> <li>• learners are informed of the context and purpose of the assessment and the assessment process;</li> <li>• feedback is provided to learners about the outcomes of the assessment process and guidance given for future options;</li> <li>• time allowance to complete a task is reasonable and specified to reflect the industry context in which the task takes place.</li> </ul> <p>Assessment strategies should be designed to:</p> <ul style="list-style-type: none"> <li>• cover a range of skills and knowledge required to demonstrate achievement of the course aim;</li> <li>• collect evidence on a number of occasions to suit a variety of</li> </ul>
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	<p>contexts and situations;</p> <ul style="list-style-type: none"> <li>• be appropriate to the knowledge, skills, methods of delivery and needs and characteristics of learners;</li> <li>• assist assessors to interpret evidence consistently;</li> <li>• recognise prior learning.</li> <li>• be equitable to all groups of learners</li> </ul> <p>Assessment methods are included in each unit and include:</p> <ul style="list-style-type: none"> <li>• oral and/or written questioning;</li> <li>• inspection of final process outcomes;</li> <li>• portfolio of documentary on-site work evidence;</li> <li>• practical demonstration of required physical tasks.</li> </ul> <p>A holistic approach to assessment is encouraged. This may be achieved by combining the assessment of more than one unit where it better replicates working practice.</p> <p>Assessment of the imported unit must reflect the requirements of the Assessment Guidelines for the relevant Training Package.</p>
<p><b>6.2 Assessor competencies</b></p>	<p><i>Standard 12 AQTF Standards for Accredited Courses</i></p> <p>Assessment must be undertaken by a person or persons with competencies compliant with:</p> <ul style="list-style-type: none"> <li>• Standard 1.4 of the <i>AQTF: Essential Conditions and Standards for Continuing Registration</i>, and/or</li> <li>• Standard 1, Clauses 1.13, 1.14, 1.15, 1.16 and 1.17 of the <i>Standards for Registered Training Organisations 2015 (SRTOs)</i>, and/or</li> <li>• The relevant Standards for Registered Training Organisations in effect at the time of assessment.</li> </ul> <p>Assessors of the endorsed unit of competence must meet the requirements for assessors specified in the relevant Training Package.</p>
<p><b>7. Delivery Standards 11 and 12 AQTF Standards for Accredited Courses</b></p>	
<p><b>7.1 Delivery modes</b></p>	<p><i>Standard 11 AQTF Standards for Accredited Courses</i></p> <p>The following range of delivery methods are available :</p> <ul style="list-style-type: none"> <li>• work-based training and assessment;</li> <li>• RTO-based training and assessment;</li> <li>• part RTO and part work based training and assessment;</li> <li>• recognition of prior learning combined with further training as required;</li> <li>• full time or part time study.</li> </ul> <p>There are no restrictions on offering the program on either a full-time or part-time basis.</p> <p>Delivery methods should allow for self-directed development and</p>



	<p>achievement, high level and independent judgement and taking accountability for outputs. Some areas of content may be common to more than one element/performance criteria and therefore some integration of delivery may be appropriate.</p> <p>Due to the potential for a dispersed distribution of learners, course providers may wish to consider non-traditional strategies in the delivery of training. The facilitation of distance learning and the achievement of competencies through workplace activities or off-the-job training should be fostered and encouraged where possible.</p> <p>Providers may contextualise units to suit particular learners by using material relevant to the students' experience or traditions and by extending the required knowledge of units. Generally, this means:</p> <ul style="list-style-type: none"> <li>• Elements and associated performance criteria must not be altered in any way;</li> <li>• The Range Statement may be expanded as long as it does not increase the complexity of the unit</li> <li>• The Evidence Guide may be expanded as long as it retains the integrity of the unit and does not jeopardise the student's potential to achieve the competency.</li> <li>• Learning and assessment resources may be tailored to the specific needs of the target group, while maintaining their validity</li> <li>• Contextualisation of the endorsed imported unit of competency must be consistent with the guidelines of the relevant Training Package</li> </ul>
<p><b>7.2 Resources</b></p>	<p><i>Standard 12 AQTF Standards for Accredited Courses</i></p> <p>General facilities, equipment and other resources required to deliver the proposed Certificate IV in Electrical Inspection include:</p> <ul style="list-style-type: none"> <li>• training facilities and equipment;</li> <li>• access to computers and internet;</li> <li>• relevant standards, texts and references;</li> <li>• appropriate environmental safeguards</li> <li>• health and safety facilities and equipment;</li> <li>• a workplace or a simulated workplace environment, appropriate to the assessment tasks.</li> </ul> <p>Training must be undertaken by a person or persons with competencies compliant with:</p> <ul style="list-style-type: none"> <li>• Standard 1.4 of the <i>AQTF: Essential Conditions and Standards for Continuing Registration</i>, and/or</li> <li>• Standard 1, Clauses 1.13, 1.14, 1.15, 1.16 and 1.17 of the <i>Standards for Registered Training Organisations 2015 (SRTOs)</i>, and/or</li> <li>• The relevant Standards for Registered Training Organisations in effect at the time of assessment.</li> </ul>

<p><b>8. Pathways and articulation</b></p>	<p><i>Standard 8 AQTF Standards for Accredited Courses</i></p> <p>There are no formal arrangements for articulation to other accredited courses or the higher education sector.</p> <p>When arranging articulation providers should refer to the:  <a href="#"><u>AQF Second Edition 2013 Pathways Policy</u></a></p> <p>Participants must negotiate individual pathway arrangements directly with training provider.</p> <p>This course contains nationally endorsed units of competencies. Participants who successfully complete any of these units will be able to gain credit into other qualifications containing these units in any future studies.</p>
<p><b>1. Ongoing monitoring and evaluation</b></p>	<p><i>Standard 13 AQTF Standards for Accredited Courses</i></p> <p>The Certificate IV in Electrical Inspection will be maintained and monitored by the Curriculum Maintenance Manager (CMM)- Engineering Industries.</p> <p>A formal review will take place once during the period of accreditation and will be informed by feedback from users of the curriculum and will:</p> <ul style="list-style-type: none"> <li>• review the implementation of the course;</li> <li>• provide advice on changing industry training requirements;</li> <li>• monitor and evaluate course standards, delivery and assessment;</li> <li>• recommend minor changes to the program.</li> </ul> <p>Recommendations for significant changes to the course resulting from course monitoring and evaluation procedures will be reported to the VRQA.</p> <p>Course maintenance and review procedures may also indicate that the course in total should be expired if a suitable qualification becomes available through the development, review or continuous improvement process of a Training Package.</p>

## Section C: Units of competency

### Imported units of competency from Training Packages:

BSBSMB405	Monitor and manage small business operations
CPCCWHS1001	Prepare to work safely in the construction industry
UEENEEC010B	Deliver a service to customers

### Victorian units of competency:

VU21938	Work within the context of an electrical inspector
VU21939	Apply fundamental principles in the design and installation of electrical installations
VU21944	Apply the "Victorian Service and Installation Rules" to inspection of electrical installations
VU21940	Inspect, test and administer electrical installations
VU21941	Inspect and test electricity generation systems
VU21942	Inspect and test heavy current switchboards ( $\geq 800$ Amps) and associated switchgear and control gear
VU21943	Investigate incidents of minor electric shock
VU21945	Produce electrical inspection reports
VU21946	Inspect, test and administer hazardous electrical installations
VU21947	Inspect, test and administer high voltage installations
VU21948	Inspect, test and administer medical installations

VU21938

**Work within the context of an electrical inspector**

**Unit Descriptor**

This unit provides the context within which an Electrical Inspector would work in Victoria. It clarifies the requirements for the different classes of Electrical Inspector as defined by Energy Safe Victoria.

The skills and knowledge described in this unit require a license to practice in the workplace subject to the regulations for undertaking electrical work.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

**Employability Skills**

This unit contains Employability Skills.

**Application of the Unit**

The skills and knowledge contained within this unit would normally be applied by a licensed electrical inspector at the request of the electrical safety regulator.

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Establish the context of electrical inspection work

- 1.1 The **role** and **responsibilities of an electrical inspector** are confirmed
- 1.2 **Licensing requirements** and the different **classes of license** specified by the regulator are confirmed
- 1.3 The relevant **electrical standards** set by the regulator are sourced and interpreted
- 1.4 Relevant **OH & S** and **environmental requirements** for conducting electrical inspection work are determined
- 1.5 Risk control measures relating to electrical inspection work are determined
- 1.6 The work context of different Classes of electrical inspector as defined by Energy Safe Victoria, are differentiated
- 1.7 Reporting requirements for the outcomes of electrical inspections are clarified
- 1.8 **Appropriate personnel** are identified to whom electrical inspection reports for the work should be provided
- 1.9 A framework for conducting electrical inspection work is developed and applied

2. Work within an appropriate electrical inspection framework

- 2.1 The context of the inspection work is determined and its correct alignment with the class of Electrical Inspector is confirmed
- 2.2 Limitation in personal license classification for specific electrical environments are acknowledged and **appropriate action** taken
- 2.3 Appropriate personnel are consulted before conducting the inspection
- 2.4 Relevant OH & S and environmental requirements for conducting the electrical inspection work are applied
- 2.5 Appropriate risk control measures are implemented to ensure the work area is safe for electrical inspection



- 2.6 Non-compliance defects are documented and actions taken with the scope of the inspection responsibilities and **regulatory requirements**
- 2.7 Relevant inspection report is made and issued to the customer, electrical contractor and regulator in accordance with regulatory requirements

## REQUIRED SKILLS AND KNOWLEDGE

*This describes the essential skills and knowledge and their level, required for this unit*

### Skills:

- Communicating with appropriate personnel and the regulator
- Determining the scope of the electrical inspection work in relation to the Class of the Electrical Inspector
- Implementing risk control measures to ensure that the electrical work is safe for inspection
- Organising tasks within the framework of an electrical inspection for the class of inspection to be performed
- Solving problems in order to manage unexpected situations for the class of electrical inspection.
- Reporting skills to document non-compliances in accordance with regulatory requirements
- Reading and interpreting standards

### Knowledge:

- Electrical Safety (Installation) Regulations
- Electricity Safety (Registration and Licensing) Regulations
- Licensing requirements for Electrical Inspectors
- Different classes of Electrical Inspector as defined by Energy Safe Victoria
- Regulatory requirements for reporting outcomes of electrical inspections
- Occupational health and safety requirements when working with electricity
- Technical standards, regulations and codes for general electrical installations
- Electrical safe work practices
- Environmental and heritage issues

## RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below

### ***Role of Electrical Inspectors*** includes:

- Inspecting electrical installation work, as permitted by the class endorsement issued including disconnecting and reconnecting for testing purposes.
- The act of carrying out an electrical inspection for the purpose of certification of the electrical installation is not considered to be electrical installation work and, as such, no certificates of electrical safety are required to be issued by the licensed Electrical Inspector.

**Responsibilities of an Electrical Inspector**

include:

- Electrical Inspectors are responsible for attending the electrical installation, carrying out the inspection and testing, and they must state on the certificate if the installation appears to be electrically unsafe
- They must not inspect prescribed electrical installation work if they were the licensed electrical installation worker who carried out the work, or the responsible person in relation to that work.
- They also must not have been involved with the design of the installation work and be the electrical inspector.
- They must be in possession of a certificate of compliance for prescribed electrical installation work prior to commencement of the inspection.
- They must ensure that the certificate of compliance contains a detailed description of all the electrical work to be inspected.
- They must sign the certificate of inspection within the certificate of electrical safety certifying that the prescribed electrical installation work carried out, or supervised, by the licensed electrician meets all the requirements of the legislation and regulations
- They must document the outcomes of the electrical inspection identifying any non-compliance found

**Licensing requirements**

include:

- Electricity Safety (Registration and Licensing) Regulations
- All applicants for a license must complete the relevant theory and practical licensing assessments, or equivalent, as deemed by the ESV
- A license may be issued to an applicant for the purpose of inspecting electrical installation work. Licenses are issued wholly at the discretion of ESV.
- The electrical installation work may be one of respective classes of prescribed electrical installation work or for non-prescribed electrical installation work.
- The license may also give credibility for a person when assessing electrical installations for safety, in addition to inspections carried out for regulatory requirements.

**Classes of license** are:

- Class G (General)
- Class H (Hazardous Areas)
- Class V (High Voltage Installation)
- Class M (Medical Installations)

**Electrical standards**

include, but are not limited to:

- Occupational Health & Safety Act (VIC) - Section 25
- Electricity Safety Act
- Electricity Safety (Installations) Regulations
- AS/NZS3000 Wiring Rules
- AS/NZS 3003 Patient Areas
- AS/NZS3008.1.1 Selection of Cables
- AS/NZS4836 Code of Practice for Safe Electrical Work – (Low Voltage Electrical Installations)
- AS/NZS3012 Electrical Installations Construction and Demolition Sites

- AS/NZS 60079 Series Hazardous Electrical Installations
- Distributor's Technical Requirements, such as the Victorian Service Installation Rules (VSIR)
- Code of Practice of Electrical Safety for Works on or near high voltage (The Blue Book and Orange Book as required)
- AS/NZS 2067 Substations & High Voltage installations
- ESV defect list
- Other references and text, as required

**OH & S requirements**  
include, but are not limited to:

- Legislation
- Personal Protective equipment including LV, HV & arc flash.
- Material safety management systems
- Hazardous substances and dangerous goods code
- Local site induction procedures

**Environmental requirements** include, but are not limited to:

- liquid waste
- solid waste
- gas, fume, vapour, smoke emissions, including fugitive emissions
- excessive energy and water use
- excessive noise

**Appropriate personnel**  
include, but are not limited to:

- Supervisor
- Leading hand
- Foreman
- Manager
- Site engineer
- Trainer
- Mentor
- Teacher
- Consultant
- Electrical worker
- Registered electrical contractor
- Team member

**Appropriate action**  
includes, but is not limited to:

- Providing advice to customers on the need to employ a suitably licensed Inspector for the job
- Referral to appropriately licensed Inspectors for the specific electrical environment

**Regulatory requirements**  
include, but are not limited to:

- Applicable resources, but not limited to:
  - Electricity Safety (Installations) Regulations
  - Electricity Safety (Registration and Licensing) Regulations
  - AS/NZS Standards
  - AS Standards
  - Codes of Practice
  - Legislation and regulations
  - Industry guidelines



## EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

### **Critical aspects for assessment and evidence required to demonstrate competency in this unit**

- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge and skills.
- In particular, this shall incorporate evidence that shows a candidate is able to:
  - Implement occupational health and safety workplace procedures and practices including the use of risk control measures appropriate to the electrical inspection work area;
  - Establish an effective framework within which to conduct electrical inspections;
  - Determine the appropriate Class of Electrical Inspector required for different electrical installations;
  - Identify and consult with appropriate personnel in relation to electrical inspection work;
  - Identify and document non-compliances with regulatory requirements in electrical inspections, including associated paperwork;
  - Document the outcomes of electrical inspections in accordance with regulatory requirements.

### **Context of and specific resources for assessment**

- This unit may be assessed on-the-job, off-the-job or a combination of both on and off-the-job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used, where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all information, tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
- The competencies covered by this unit would be demonstrated by an individual working alone.

### **Methods of assessment**

- Assessment of this unit must include demonstration of practical skills and may also include:
  - Oral or written questions
  - Written assignments
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered in this unit.

**VU21939**

**Apply fundamental principles in the installation of electrical installations**

**Unit Descriptor**

This unit develops the knowledge and skills to apply safety principles and control in the design and installation of electrical installations. It includes control and protection, performance requirements with consideration of maximum demand, current carrying capacity of cables, voltage drop requirements, selectivity and discrimination of protective devices, cable installation methods, location and routes as well as verification of cable routes, terminations, circuits and connections.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

**Employability Skills**

This unit contains Employability Skills.

**Application of the Unit**

The skills and knowledge of this unit would be applied by licensed electrical workers and professional electrical engineers involved in the design and installation of electrical installations in domestic, commercial and industrial environments.

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Source relevant knowledge to the design and installation of electrical work

- 1.1 The extent and nature of the electrical installation is determined from job specifications and/or in consultation with **appropriate person(s)**
- 1.2 Information about the safety aspects and performance requirements of the electrical installation are interpreted
- 1.3 Safety and other **regulatory requirements** with which the electrical installation must comply are identified and interpreted
- 1.4 Load requirements for individual current-using equipment are confirmed from job specifications and/or from consultation with appropriate person(s)
- 1.5 Cable routes, lengths of cables and the **conditions** in which the wiring system is to operate are determined

2. Incorporate safety principles in the design and installation of electrical installations

- 2.1 Wiring systems are selected for suitability for the environments in which they are to operate
- 2.2 Cable conductor sizes are selected to meet current-carrying capacity requirements, as well as voltage-drop and earth fault-loop impedance limitations
- 2.3 Circuit protective devices are selected to meet requirements for coordination with conductor current-carrying capacity
- 2.4 Circuits, control and protective devices are arranged to ensure safe and functional operation of the installation and to comply with technical standards and the job specifications
- 2.5 **Earthing** is arranged and terminated to comply with the requirements of the **MEN system**

- 2.6 Residual current devices are selected to meet the required circuit switching and tripping currents required
  - 2.7 Switchgear/control gear is selected to meet current, voltage and IP ratings, as well as functional requirements
  - 2.8 Switchboards are arranged to accommodate control and protective devices, links, safety services and other distributor equipment in accordance with requirements
3. Document the safety controls and protection arrangements for electrical installations
  - 3.1 Confirmation is obtained from manufacturers/suppliers that the electrical equipment selected complies with all of the requirements of the installation
  - 3.2 Reasons for selections made, including relevant calculations, are documented in accordance with established procedures
  - 3.3 Electrical installation arrangement and specifications for all selected items are documented, in accordance with established procedures and forwarded to appropriate person(s)

## **REQUIRED SKILLS AND KNOWLEDGE**

*This describes the essential skills and knowledge and their level, required for this unit*

### **Required skills**

- Organising skills to sequence tasks to maximum benefit
- Selecting and arranging wiring, accessories, power cables, protection devices, earthing and conductor terminations in electrical installations
- Selecting correct tools, cables and equipment for electrical installations
- Selecting cables to satisfy circuit requirements in addition to current carrying capacity requirements
- Selecting and using protection devices to ensure protection of persons, livestock and property
- Complying with the Wiring Rules for providing protection against direct and indirect contact
- Selecting appropriate devices for isolation and switching purposes
- Selecting equipment suitable for installation in given damp situations
- Interpreting relevant Standards, job specifications and wiring diagrams
- Calculating relevant electrical parameters, such as voltage drop in a given circuit, or fault loop impedance for a given circuit arrangement
- Problem solving skills to manage unexpected situations
- Numeracy skills to calculate required parameters

### **Required knowledge:**

- Safety principles when working with electricity, as given in Part 1 (Section 1) of the Wiring Rules in AS/NZS 3000 with deemed-to-comply requirements given in Sections 2 to 8
- Compliant methods for providing protection
- Terms 'touch voltage' and 'touch current'
- Requirements for installation, design and selection of equipment
- Application and arrangement of an isolated supply

- Technical standards, regulations and codes for electrical installations
- Electrical wiring systems
- Electrical installations, wiring, cabling and accessories
- Electrical installations equipment requirements
- Cable routes and methods of mechanical protection and support
- Prohibited cable locations
- Power cable and conductor connections
- Current requirements for given final sub-circuits

### *Design & Safety encompassing:*

- Protective devices
- Harmful effects against which the design of an electrical installation must provide protection
- Performance standards of a correctly functioning electrical installation
- Supply characteristics that shall be considered when designing an electrical installation
- Acceptable methods for determining the maximum demand in consumer's mains and sub-mains
- AS/NZS 3000 requirements limiting voltage drop in an installation
- Typical external factors that may damage an electrical installation and need to be considered in the installation design
- Methods for protecting persons and livestock against direct and indirect contact with conductive parts
- Acceptable methods of protection against the risk of ignition of flammable materials and injury by burns from the thermal effects of current in normal service
- Likely sources of unwanted voltages and the methods for dealing with this potential hazard
- Acceptable methods for protecting persons and livestock against injury and property against damage from the effects of over current
- Requirements for protection against fault current
- Requirements for protection against the harmful effects of faults between live parts of circuits supplied at different voltages
- Need for protection against injury from mechanical movement and how this may be achieved
- Requirements for coordination between protective devices and conductors
- Requirements for coordination of protection devices for discrimination and back-up protection
- Features of 'fire rated construction' and how the integrity of the fire rating can be maintained in relation to the electrical installation

### *Earthing:*

- Selection of minimum size earthing conductor for a range of active conductor sizes and materials
- Parts of an earthing system and the purpose of each
- Typical arrangements of a MEN earthing system
- Arrangement of protective earthing conductors that comply with the Wiring Rules
- Requirements for equipotential bonding in a range of installation situations

### *Protection against overload and short circuit current:*

- Overload current or fault currents in an electrical installation
- Equivalent circuit of an earth fault-loop
- Level of fault current possible at a given point in an installation from the fault-loop impedance and data from the electricity distributor
- Methods and devices that comply with the Wiring Rules AS/NZS 3000 for providing protection against the damaging effects of overload and fault current

### *Devices for automatic disconnection of supply:*

- Time/current curves
- Tripping characteristic of various types of circuit breakers
- Fusing characteristics of various types of fuses
- Tripping characteristics of various types of Residual Current Devices (RCDs)
- Maximum impedance of an earth fault-loop to ensure operation of a protection device
- Fuses for fault current limiting protection

### *Control of an electrical installation and circuits:*

- Switch types, current and voltage rating and IP rating, and where these apply
- Switching requirements for isolation, emergency, mechanical maintenance and functional control
- Control arrangement for complete installations with and without safety services and an alternative supply

### *Switchboard/distribution boards:*

- Compliance requirements, including but not limited to, location and access, protection against internal arcing faults, identification, construction suitability, equipment marking, wiring and fire protection

### *Factors affecting the suitability of wiring systems:*

- Installation conditions that may affect the current-carrying capacity of cables
- External influences that may affect the current-carrying capacity and/or may cause damage to the wiring system
- AS/NZS 3000 requirements for selecting wiring systems for a range of circuits, installation conditions and construction methods into which the wiring system is to be installed

### *Maximum demand on consumer's main/sub-mains:*

- Acceptable methods for determining the maximum demand on an installation's consumer's mains and submains

### *Cable selection based on current carrying capacity:*

- Installation conditions for a range of wiring systems and applications.
- External influences that require the use of a derating factor
- AS/NZS 3000 requirements for coordination of cables and protection devices
- AS/NZS 3008.1.1 used to select conductor size based on the maximum current requirement for a given installation condition including any applicable derating factors

### *Cable selection based on voltage drop requirements:*

- AS/NZS 3000 requirements for maximum voltage drop in an installation
- Relevant tables in AS/NZS 3008 for unit values of voltage drop

### *Cable selection based on fault loop impedance requirements:*

- AS/NZS 3000 requirements for maximum fault loop impedance in an installation.
- relevant tables in AS/NZS 3008.1.1 to determine cable impedances

### *Requirement for installation of cables and accessories in damp situations:*

- Restricted zones around baths, showers, fixed water containers, pools, sauna heaters and fountains/water features for given installations
- Equipment suitable for installation within given zones of damp situations

### *Aerial cabling:*

- AS/NZS 3000 and local supply authority requirements for aerial cabling
- Termination of aerial cables in accordance with AS/NZS 3000 and local requirements.
- Consumer's mains connection via overhead consumer's terminals, in accordance with AS/NZS 3000 and local requirements

### *Underground cabling:*

- Permissible underground cabling system requirements as detailed within the Electricity Safety (Installation) Regulations
- AS/NZS 3000 and local supply authority requirements for underground cabling
- Underground consumer's mains selection in accordance with AS/NZS 3000 and local requirements

### *Techniques for installing cables and wiring systems:*

- Typical cable routes through buildings, structures and premises for electrical installations comprising of multiple occupancies, sub-divisions and embedded networks
- Cable and conductor terminations
- Maintaining fire rating integrity
- Inspecting and testing installed and terminated cables to ensure they comply with polarity, correct circuit connections, continuity and insulation resistance and are safe to connect to the supply

### *Protection devices:*

- Acceptable methods of protection against indirect contact
- AS/NZS 3000 requirements for selecting methods and devices to protect against indirect contact for a range of installation types and conditions
- Coordination between conductors and protection devices to ensures the protection of cables from over-heating due to over current
- Possible injuries to persons and livestock from hazards due to a short circuit
- AS/NZS 3000 requirements for selecting devices to protect against overload current for a range of circuits and loads
- AS/NZS 3000 requirements for selecting devices to protect against short-circuit current for a range of installation conditions

### *Protection against voltage and under voltage:*

- Methods for protection against over voltage
- Methods for protection against under voltage

### *Devices for isolation and switching:*

- Requirements for the provision of the isolation of every circuit in an electrical installation
- Need for protection against mechanical movement of electrically activated equipment.
- AS/NZS 3000 requirements for selecting devices for isolation and switching for a range of installations and conditions



### Switchboards:

- AS/NZS 3000 and local supply authority requirements for switchboards
- Equipment installed at the main switchboards with capacities up to 800 A per phase
- Layout of a main switchboard for various installations
- Local supply authority requirements for connection of an electrical installation to the electrical supply system

### RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

#### ***Appropriate persons***

may include:

- Job supervisors
- Project managers
- Engineers
- Clients

***Regulatory requirements*** include, but are not limited to:

- Applicable resources, but not limited to:
  - AS/NZS 3000 and 3008.1.1 Standards
  - AS/NZS and AS Standards
  - Codes of Practice
  - Legislation and regulations
  - Industry guidelines

***Conditions*** include, but are not limited to:

- High temperature
- Low temperature
- Damp

***Earthing*** refers to:

- Earthing systems that consist of a main earthing conductor, protective earthing conductors, bonding conductors which are connected together and to the general mass of earth.

***MEN system*** refers to:

- The Multiple Earthed Neutral (*MEN*) earthing system commonly used in Australia

### EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

**Critical aspects for assessment and evidence required to demonstrate competency in this unit**

- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the associated performance criteria, including the required knowledge.
- In particular, this shall incorporate evidence that shows a candidate is able to:
  - Identify and apply relevant safety information relating to the design and installation of electrical systems;
  - Incorporate occupational health and safety workplace

- procedures and practices appropriate to electrical work;
- Select suitable equipment, controls and protective devices to ensure safe and efficient performance of electrical installations;
- Document the information used in the design and installation of electrical systems, in accordance with established procedures.

### **Context of and specific resources for assessment**

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

### **Methods of assessment**

- Assessment of this unit must include the demonstration of practical skills and may also include:
  - Case study analyses
  - Oral or written questions
  - Written assignments
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered in this unit.



VU21944

Apply the 'Victorian Service & Installations Rules' to the inspection of electrical installations

Unit Descriptor

This unit of competency sets out the knowledge and skills required to safely perform the inspection and testing of electrical installations to ensure they meet the requirements of the Victorian Service & Installations Rules.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability Skills

This unit contains Employability Skills

Application of the Unit

The skills and knowledge contained in this unit would normally be applied by a licensed electrical inspector conducting the inspection and testing of electrical installations.

ELEMENT

Elements describe the essential outcomes of a unit of competency

PERFORMANCE CRITERIA

Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

1. Plan to conduct inspection and testing

- 1.1 Relevant **OH&S** and **environmental requirements** for a given work area are obtained and clarified
- 1.2 Victorian Service & Installations Rules pertaining to the specific electrical installation and inspection tasks are sourced.
- 1.3 Established OH&S requirements and risk control measures and procedures are followed in preparation of the work area
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with **appropriate personnel**
- 1.4 Inspection and testing requirements are determined from documentation, job sheets or discussions with appropriate personnel
- 1.5 Sources of materials that may be required in the inspection and testing are identified, in accordance with established procedures
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site
- 1.7 Resources, tools and test equipment needed for the task are identified

2. Determine compliance inspection requirements for the electrical installation

- 2.1 OH&S and risk control measures and procedures for carrying out the work are followed
- 2.2 Victorian Service & Installations Rules pertaining to the specific electrical installation and inspection tasks are interpreted
- 2.3 The need to test for live is determined in strict accordance with OH&S requirements and established safety procedures

- 2.4 Evidence that the electrical installation complies with safety requirements is sought from manufacturers and/or regulator and sighted, where deemed necessary
  - 2.5 Detailed inspection and testing of the equipment, wiring and protection systems is conducted in accordance with the Victorian Service & Installations Rules and as outlined in the relevant Electricity Safety (Installation) Regulations
  - 2.6 Methods for dealing with unexpected situations are applied on the basis of safety and specified work outcomes and discussed with appropriate personnel
3. Document and take action from inspection outcomes
- 3.1 Relevant OH&S and risk control measures for work completion are followed
  - 3.2 Non-compliant defects are documented and actions taken in accordance with the scope of inspection responsibilities and the Victorian Service & Installations Rules
  - 3.3 Work site is made safe in accordance with established safety procedures
  - 3.4 Relevant inspection report is made and issued to customer, electrical contractor and Supply Authority in accordance with their requirements

### **REQUIRED SKILLS AND KNOWLEDGE**

This describes the essential skills and knowledge and their level, required for this unit.

#### **Skills:**

- Interpreting and applying the Victorian Service & Installations Rules (VSIR's)
- Applying relevant OH&S procedures
- Operating within the vicinity of live conductors, such as barriers
- Organise a sequence of tasks to maximum benefit
- Solve problems in managing unexpected situations
- Reporting skills to document non-compliance in accordance with enterprise procedures

#### **Knowledge:**

- Electrical safe practices of working safely on or around electrical installations
- Occupational health & safety requirements when working with electricity, such as compliance with AS/NZS 4836 standard
- Technical standards, regulations and codes for general electrical installations
- The general requirements of the VSIR's
- Supply application, connection & disconnection
- Supply types, use & protection
- Connecting to the low voltage network
- Low voltage metering, direct current and current transformer (CT)
- Connection and metering requirements for High voltage electrical Installations
- Negotiating supply arrangements, metering requirements & communicating with an Electricity Distributor

### **RANGE STATEMENT**

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The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

### ***OH&S requirements***

include, but are not limited

- Legislation
- Personal protective equipment
- Material safety management systems
- Hazardous substances and dangerous goods code
- Local site induction operation procedures
- Awards provisions

### ***Environmental***

***requirements*** include, but are not limited to:

- Liquid waste
- Solid waste
- Gas, fume, vapour, smoke emissions, including fugitive emissions
- Excessive energy and water use
- Excessive noise

### ***Appropriate personnel***

include, but are not limited to:

- Project officer
- Supervisor
- Leading hand
- Foreman
- Manager
- Site engineer
- Trainer
- Mentor
- Teacher
- Team member
- Consultant
- Electricity Distributor representative
- Electrical installation worker
- Registered electrical contractor

## EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

### Critical aspects for assessment and evidence required to demonstrate competency in this unit

- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.
- In particular, this must incorporate evidence that shows a candidate is able to:
  - a) implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range statement;
  - b) demonstrate essential knowledge and associated skills as described in this unit;
  - c) demonstrate a representative body of performance within a timeframe typically expected of the discipline, work function and industrial environment; and conduct actual or simulated inspections related to the VSIR's;
  - d) Document information of non-compliant defects and action taken.

### Context of and specific resources for assessment

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered by this unit.

### Method of assessment

- Evidence can be gathered through a variety of ways including:
  - observation of processes and procedures;
  - oral and/or written questioning on required knowledge and skills;
  - testimony from supervisors, colleagues, clients and/or other appropriate persons;
  - inspection of the final report;
  - a portfolio of documentary on-site work evidence.
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

**VU21940**

**Inspect, test and administer electrical installations**

**Unit Descriptor**

This unit of competency sets out the knowledge and skills required to safely perform the visual inspection and testing of electrical equipment and associated wiring installed in an electrical installation. This does not include electrical installations classified as H, V and M as prescribed by the regulatory requirements.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

**Employability Skills**

This unit contains Employability Skills.

**Prerequisite Unit**

VU21939 Apply fundamental principals in the design and installation of electrical installations

**Application of the Unit**

The skills and knowledge contained within this unit would normally be applied by a licensed electrical inspector testing circuitry in electrical installations. Attainment of this unit allows a suitably qualified person to apply for licensing as an Electrical Inspector, subject to any other requirements demanded by the regulatory authority.

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Plan to conduct inspection and testing

- 1.1 **OH & S** and **environmental requirements** for working in a given area are determined
- 1.2 Established OH & S requirements and risk control measures and procedures for the work area are followed
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented, in consultation with appropriate personnel
- 1.4 Inspection and testing requirements are determined from the **regulatory requirements** and/or discussions with **appropriate personnel**
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site
- 1.6 Where applicable, necessary work permits are obtained from appropriate personnel, in accordance with regulatory requirements
- 1.7 **Resources**, tools and the suitability of test **equipment** needed for the task are obtained in accordance with enterprise procedures and checked for correct operation and safety

2. Conduct inspection and testing of electrical installations

- 2.1 Relevant OH&S policies and procedures for carrying out the work are followed, including determining the need to test for live in strict accordance with established safety procedures
- 2.2 Equipment/machines are checked as being isolated, where necessary, in strict accordance with OH & S requirements and industry Code of Practice
- 2.3 Detailed inspection and testing of the consumer's mains and main switchboard is conducted methodically to verify compliance of protection, metering, earthing systems, circuit arrangements and labelling



- 2.4 Detailed inspection and testing of circuits is conducted methodically to verify compliance of the installed wiring, accessories, switchgear/control gear and current consuming devices for compliance with the appropriate documentation
  - 2.5 Detailed inspection and testing is conducted to verify compliance of earthing conductors, insulation resistance, polarity, correct circuit connections and operational requirements of residual current devices
  - 2.6 Defects that may affect the integrity of the protected equipment and wiring system are identified and recorded
  - 2.7 Equipment parts and circuit connections are replaced after the inspection and testing of each item, in a manner that ensures the integrity of the protection system is maintained.
  - 2.8 Relevant OH&S requirements for work completion are followed
  - 2.9 Defects are identified with reference to appropriate clauses in appropriate standards
  - 2.10 Defects as identified are recorded on the Certificate of compliance using the Energy Safe Victoria defect list number
3. Document and take action on inspection outcomes
    - 3.1 Non-compliant defects are identified with reference to appropriate clauses in regulatory standards and documented on the certificate of compliance in accordance with regulatory requirements
    - 3.2 Actions are taken on non-compliant defects, in accordance with the scope of inspection responsibilities
    - 3.3 Work site is made safe in accordance with established safety procedures
    - 3.4 Relevant inspection report is made and issued to customer, licensed electrical worker and regulator in accordance with regulatory requirements

### REQUIRED SKILLS AND KNOWLEDGE

*This describes the essential skills and knowledge and their level, required for this unit*

#### **Required skills**

- Organise a sequence of tasks to maximum benefit
- Select correct tools and equipment for electrical installations testing
- Conduct inspection and mandatory tests on electrical installations following safe procedures
- Interpret wiring diagrams
- Solve problems in managing unexpected situations
- Reporting skills to document non-compliances in accordance with enterprise procedures
- Reading and interpreting standards

#### **Required knowledge:**

- Occupational health & safety requirements when working with electricity, such as compliance with AS/NZS 3012 and AS/NZS 3000 and AS/NZS3017 and AS/NZS 4836 standards
- Technical standards, regulations, processes, procedures and codes for general electrical installations
- Electrical safe work practices
- Electrical wiring systems
- Electrical installations, wiring and accessories
- Electrical installations, equipment requirements
- Cables installed within buildings, structures and premises

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- Power cable and conductor connections
- Testing devices
- Alternating current rotating machines
- Single and three-phase transformers
- Luminaries and lighting systems
- Environmental and heritage issues
- Reporting and communication requirements

### Preparation for inspection and testing

- OH&S policies, work procedures and relevant instructions
- Risk assessment and management of work
- Preparation of the work-site for inspection and testing
- Notification of inspection and testing work to other personnel on work-site.
- Selection and checking of equipment and tools
- Testing for live procedures in accordance with OH&S and regulatory requirements
- Correct operation of the insulation resistance tester and other test equipment.
- Inspection procedures in accordance with regulatory requirements
- Testing procedures are understood

### Inspection and testing to include

- Testing procedures in accordance with regulatory requirements
- cable terminations at pole and ground mounted sub-stations
- underground route plan
- switch-room access doors – location, direction of egress and locking
- main switchboard - room labelling
- current Transformer (CT) orientation
- CT metering chamber and metering panel earthing
- location of switchboard
- plan indication of other switchboards at each main switchboard and fire indicator panel or at each main entrance to the building
- switchboard size and exits from switchboard area
- switchboard access for safe working and egress e.g. switchboard doors, handles, cable zone access
- cable entry/exit into/from main switchboard (fireproof rating)
- cable gland plates – non-ferrous materials
- methods of earthing – common earthing/normal earthing
- main earthing conductor size
- equipotential bond
- labelling of MEN connection point
- access to neutral bar
- labelling of neutral bar
- corresponding numbering of neutral conductors to match associated actives
- mains wiring/installation method suitable for Safety services
- maximum demand calculation/limitation – consumer's mains – consumer's mains size
- voltage drop requirements
- cable installation method e.g. paralleling
- main switchboard construction
- main switch size (A)
- main switches identified by appropriate colouring

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- capacity of potential fault level – capacity of components kA ratings/switchboard rating tag
- internal switchboard wiring e.g. fault-current limiters, busbar rating
- labelling of fault current limiters
- clearances between phases/earth connections
- connection, separation and segregation of safety services conductors
- segregation of essential services switchgear
- ratings of safety services switchgear – current rating of equipment
- labelling of safety services
- manual and automatic changeover/standby switching – AS/NZS3000 (alternative supplies) and AS3010
- mechanical interlocking - castel key installations
- sub-mains size
- type II installation sub-mains to individual occupier, individual occupier's switchboard, sub-mains protection, sub-mains current rating, earthing arrangements, control and protection
- identification of sub-mains passing through other tenancies, fire protection and labelling
- continuity of earthing test
- insulation resistance test
- polarity test
- correct circuit connection
- fault-loop impedance

## Reporting

- document and verify non-compliant defects through reference to current Australian/New Zealand standards
- notification to electrical contractor or electrical installation worker of non-compliant defects
- completion of appropriate inspection certification in accordance with regulatory requirements
- notification of the completion of the certificate of inspection to the Regulator in accordance with regulatory requirements.

## RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

### ***OH&S requirements***

include but are not limited to:

- legislation
- protective equipment
- material safety management systems
- hazardous substances and dangerous goods code
- local safe operation procedures

### ***Environmental***

***requirements*** include, but are not limited to:

- high voltage
- liquid waste
- solid waste
- gas, fume, vapour, smoke emissions, including fugitive emissions
- excessive energy and water use
- excessive noise



### **Regulatory**

**requirements** include, but are not limited to:

- Applicable resources, but not limited to:
  - AS/NZS 3000 and 3008.1.1 Standards
  - AS/NZS and AS Standards
  - Codes of Practice
  - Legislation and regulations
  - Industry guidelines

**Appropriate personnel** may include:

- Job supervisors
- Project managers
- Engineers
- Clients
- Electrical Workers
- Registered Electrical Contractors

**Resources** include, but are not limited to:

- Other relevant standards and the current version of:
  - Occupational Health & Safety Act (VIC)
  - Electricity Safety Act
  - Electricity Safety (Installations) Regulations
  - AS/NZS3000 Wiring Rules
  - AS/NZS3008.1.1 Selection of Cables
  - AS/NZS4836 Code of Practice for Safe Electrical Work (Low Voltage Electrical Installations)
  - AS/NZS3017 Electrical Installations – Verification Guidelines
  - AS/NZS3012 Electrical Installations Construction and Demolition Sites
  - AS/NZS 3010 Electrical Installations – Generating Sets
  - Service & Installation Rules (SIR)
  - Code of Practice of Electrical Safety for Works on or near High Voltage (The Blue Book)
  - Licensed Electrical Inspectors Manual
  - ESV defect list
  - Other references and text as required

**Equipment** includes, but is not limited to:

- Personal protective equipment (PPE) such as:
  - safety glasses
  - hard hat
  - cotton overalls/long sleeved cotton shirt and cotton trousers
  - safety footwear
- insulation resistance tester
- Multimeter
- Independent earth reel and spike
- Voltage tester

## **EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

### **Overview of Assessment**

- A person who demonstrates competency in this unit must be able to perform, interpret, document and report outcomes from the inspection and testing of electrical equipment and associated wiring that is installed in an electrical installation.

### **Critical aspects for assessment and evidence required to demonstrate competency in this unit**

- Competency in this unit cannot be claimed until at least two work inspections have been conducted in a simulated electrical installation of the electrotechnology industry and verified by an electrical inspector, who is licensed to carry out such inspection work
- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.
- In particular, this shall incorporate evidence that shows a candidate is able to:
  - implement occupational health and safety workplace procedures and practices including the use of appropriate risk control measures;
  - demonstrate a representative body of performance within a timeframe typically expected of the discipline, work function and industrial environment; and conduct a minimum of two inspections and testing tasks on electrical equipment and associated wiring installed either on-site, or in a simulated electrical installation.

### **Context of and specific resources for assessment**

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

### **Methods of assessment**

- Assessment of this unit must include the demonstration of practical skills and may also include:
  - Case study analyses
  - Oral or written questions
  - Written assignments

VU21941

Inspect and test electricity generation systems

Unit Descriptor

This unit of competency sets out the knowledge and skills required to safely perform the inspection and testing of electricity generation systems, including stand-alone systems, stand-by generation, co-generation, wind and solar powered systems. This does not include electrical installations classified as H, V and M as prescribed by the regulatory requirements.

Employability Skills

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

This unit contains Employability Skills

Application of the Unit

The skills and knowledge contained in this unit would normally be applied by a licensed electrical inspector testing electrical installations in electricity generation systems.

ELEMENT

PERFORMANCE CRITERIA

1. Plan to conduct inspection and testing

- 1.1 Relevant **OH&S** and **environmental requirements** for a given work area of the **electricity generation system** are obtained and clarified
- 1.2 Established OH&S requirements and risk control measures and procedures are followed in preparation of the work area
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with **appropriate personnel**
- 1.4 Inspection and testing requirements for the electricity generation system are determined from documentation, job sheets or discussions with appropriate personnel
- 1.5 Sources of materials that may be required in the inspection and testing are established in accordance with established procedures
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site
- 1.7 **Resources**, tools and **test equipment** needed for the task are obtained in accordance with **relevant procedures** and checked for correct operation and safety

2. Conduct compliance inspection and testing of electricity generation systems

- 2.1 OH&S and risk control measures and procedures for carrying out the **inspection** work are followed
- 2.2 The need to test for live is determined in strict accordance with OH&S requirements and conducted within established safety procedures
- 2.3 Circuits/plant are checked as being isolated, where necessary, in strict accordance with OH&S requirements and procedures
- 2.4 The state of the components making up the electricity generation system is determined by measurements, tests and inspections and the results recorded
- 2.5 Evidence that the electricity generation system complies with safety requirements is sought from manufacturers and/or regulator and sighted, where deemed necessary
- 2.6 Detailed inspection and testing of the equipment, wiring and protection systems is conducted, as outlined in the relevant AS/NZS standard

- 2.7 Methods for dealing with unexpected situations are applied on the basis of safety and specified work outcomes and discussed with appropriate personnel
3. Document and take action from inspection outcomes
- 3.1 Relevant OH&S and risk control measures for work completion are followed
- 3.2 Non-compliance defects in the electricity generation system are identified with reference to appropriate clauses in regulatory standards and documented in accordance with **regulatory requirements**
- 3.3 Non-compliant defects are documented and actions taken in accordance with the scope of inspection responsibilities to satisfy regulatory requirements
- 3.4 Work site is made safe in accordance with established safety procedures
- 3.5 Relevant inspection report is made and issued to customer, electrical contractor and regulator in accordance with regulatory requirements

### REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

#### Skills:

- Applying relevant OH&S procedures for equipment and installations
- Verifying the correct fault-level for the installation is consistent with the kA rating of the equipment
- Determining the earth fault loop impedance requirements necessary to keep touch voltage values within requirements?
- Reporting skills to document non-compliances in accordance with enterprise procedures
- Reading and interpreting standards
- Solve problems in managing unexpected situations

#### Knowledge:

- Electricity Safety Act 1998
- Electricity Safety (Installations) Regulations
- AS/NZS4836 Code of Practice for Safe Electrical Work (Low Voltage Electrical Installations)
- Installation requirements encompassing operating systems for equipment
- Wiring systems, switchgear, control gear and accessories installed to provide control and protection of electricity generation or co-generation, wind and solar electricity supply systems
- Safety requirements for alternative power systems
- Testing methods for electricity generation systems that encompass:
  - stand-alone generation
  - stand-by generation,
  - co-generation,
  - wind generation
  - solar power systems
  - PV Array
  - battery pack/s
  - inverter/s
  - storage interface
  - switchboard arrangements

- metering
- Requirements of the Regulations, Wiring rules and Australian Standards and guidelines/Codes for electricity generation systems, including standby generation, co-generation, wind and solar power systems
- Batteries and Uninterruptible Power System (U.P.S.) encompassing:
  - Isolation Switch/Main Switches, including:
    - o Provision
    - o Location
    - o labelling
  - Electricity converters
  - Manual operation of isolation switch
  - Maximum length of interconnecting conductors
  - Earthing arrangements for connection of electricity generation
  - Correct voltage, current and frequency ratings for equipment, accessories, conductors and insulation connected to the output of the electricity converters are satisfied
  - Electrical installations incorporating energy storage systems (ESS)
- Earthing requirements for compliance for alternative power supply installations in conjunction with the grid connected electrical installation M.E.N arrangement
- Testing in accordance with AS/NZS 3000 Wiring Rules & associated Standards

## RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

### ***OH&S requirements***

include, but are not limited

- legislation
- protective equipment
- material safety management systems
- hazardous substances and dangerous goods code
- local safe operation procedures
- awards provisions

### ***Environmental***

***requirements*** include, but are not limited to:

- high voltage
- liquid waste
- solid waste
- gas, fume, vapour, smoke emissions, including fugitive emissions
- excessive energy and water use
- excessive noise

### ***Electricity generation***

***system*** may include, but is not limited to:

- Stand-alone power systems (SPS) (Off Grid)
- Stand-by generation
- Co-generation Electricity converters)
  - UPS
- wind generation
- solar power systems
  - Grid Hybrid
  - Off Grid (SPS)
  - Multiple Mode Inverter (MMI)
- batteries

### ***Appropriate personnel***

include, but are not limited

- project officer
- supervisor

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- to:
- leading hand
  - foreman
  - manager
  - site engineer
  - trainer
  - mentor
  - teacher
  - Consultant
  - electrical installation worker
  - registered electrical contractor
  - team member

- Resources** include, but are not limited to:
- The current version of:
    - Occupational Health & Safety Act (Vic) - Section 25
    - Electricity Safety Act
    - Electricity Safety (Installations) Regulations
    - Renewable Energy Electricity Act 2000
    - AS/NZS3000 Wiring Rules
    - AS/NZS3010 combustion engine generator sets
    - AS/NZS3008.1.1 Selection of Cables
    - AS/NZS4836 Code of Practice for Safe Electrical Work – (Low Voltage Electrical installations)
    - AS/NZS3017 Guidelines to Electrical Testing
    - other references and text as required

- Test equipment** includes, but is not limited to:
- Personal protective equipment (PPE) such as, but not limited to -
    - HV safety gloves
    - safety glasses
    - hard hat
    - cotton Overalls/long sleeved cotton shirt and cotton trousers
  - insulation resistance & continuity tester
  - multimeter & ammeter
  - voltage tester
  - independent earth reel & spike

- Relevant procedures** include, but are not limited to:
- The use of tools and equipment
  - Instructions, including job sheets, plans, drawings and designs
  - Reporting and communication
  - Manufacturers' specifications and operational procedures

- Inspection** includes, but is not limited to:
- Diagram - System matching
  - Performance review

- Safety aspects, including:
  - Risk assessment
  - Switchboard arrangement
  - Cabling
  - Inverter
  - PV array
  - Labelling
  - battery pack/s,
  - export energy interface metering
- Compliance with relevant regulatory standards
- Applicable resources, such as:
  - Electricity Safety Act
  - Electricity Safety (Installations) Regulations
  - Victorian Distributors Service and Installation Rules
  - AS/NZS3010 combustion engine generator sets
  - AS4509 Series Standalone Power Systems
  - AS3011 Battery systems
  - AS/NZS 3000 – Wiring Rules including amendments
  - AS/NZS 3008.1.1– Electrical Installations-Selection of cables
  - AS/NZS 4777.1 – Grid connection of energy systems via Inverters – Installation requirements
  - AS/NZS 4777.2 – Grid connection of energy systems via Inverters – Inverter requirements
  - AS/NZS 4777.3 – Grid connection of energy systems via Inverters – Grid protection requirements
  - AS/NZS 5033 – Installation of photovoltaic (PV) arrays

**Regulatory requirements include, but are not limited to:**

### EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

#### **Critical aspects for assessment and evidence required to demonstrate competency in this unit**

- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.
- In particular, this must incorporate evidence that shows as candidate is able to:
  - a) implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range;
  - b) demonstrate essential knowledge and associated skills as described in this unit;



- c) demonstrate a representative body of performance within a timeframe typically expected of the discipline, work function and industrial environment; and conduct more than one on-site inspection and testing tasks on electricity generation systems.

### **Context of and specific resources for assessment**

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered by this unit.

### **Method of assessment**

- Evidence can be gathered through a variety of ways including:
  - observation of processes and procedures;
  - oral and/or written questioning on required knowledge and skills;
  - testimony from supervisors, colleagues, clients and/or other appropriate persons;
  - inspection of the final product or outcome; and
  - portfolio of documentary on-site work evidence.
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.



**VU21942** **Inspect and test heavy current switchboards (≥ 800Amps) and their associated switchgear and control gear**

**Unit Descriptor**

This unit of competency sets out the knowledge and skills required to safely perform the inspection and testing of heavy current electrical switchboards and the associated fixed electrical equipment and wiring installed in switchgear and control gear.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

**Employability Skills**

This unit contains Employability Skills

**Application of the Unit**

The skills and knowledge contained in this unit would normally be applied by a licensed electrical inspector testing heavy current switchboards in electrical installations.

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Plan to conduct inspection and testing

- 1.1 Relevant **OH&S** and **environmental requirements** for a given work area are obtained and clarified
- 1.2 Established OH&S requirements and risk control measures and procedures are followed in preparation of the work area
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with **appropriate personnel**
- 1.4 Switchgear/control gear inspection and testing requirements are determined from documentation, job sheets or discussions with appropriate personnel
- 1.5 Sources of materials that may be required in the inspection and testing are established in accordance with established procedures
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site
- 1.7 **Resources**, tools and **test equipment** needed for the task are obtained in accordance with **relevant procedures** and checked for correct operation and safety

2. Conduct compliance inspection and testing of heavy current switchboards

- 2.1 OH&S and risk control measures and procedures for carrying out the work are followed
- 2.2 The need to test for live is determined in strict accordance with OH&S requirements and conducted within established electrical industry safety procedures
- 2.3 Circuits are checked as being isolated from supply, where necessary, in strict accordance with OH&S requirements and procedures
- 2.4 The state of heavy current switchboard components is determined by measurements, tests and inspections and the results recorded
- 2.5 Evidence that the switchgear and control gear complies with the relevant AS/NZS standards and verification documents obtained from manufacturers

- 2.6 Detailed inspection and testing of the equipment, wiring and protection systems is conducted, as outlined in AS/NZS relevant standards
- 2.7 Methods for dealing with unexpected situations are applied on the basis of safety and specified work outcomes and discussed with appropriate personnel
3. Document and take action from inspection outcomes
  - 3.1 Relevant OH&S and risk control measures for work completion are followed
  - 3.2 Non-compliant defects in heavy current switchboards are identified with reference to appropriate clauses in regulatory standards and documented in accordance with **regulatory requirements**
  - 3.3 Non-compliant defects are documented and actions taken in accordance with the scope of inspection responsibilities to satisfy regulatory requirements
  - 3.4 Work site is left safe in accordance with established safety procedures
  - 3.5 Relevant inspection report is made and issued to customer, electrical contractor and regulator in accordance with regulatory requirements

## **REQUIRED SKILLS AND KNOWLEDGE**

This describes the essential skills and knowledge and their level, required for this unit.

### **Skills:**

- Communicating with appropriate personnel
- Determining safe working Standards and codes of Practice for equipment and installations equal to, or greater than 800A
- Applying relevant OH&S procedures for equipment and installations equal to or greater than 800A
- Operating within the vicinity of live conductors, such as barriers
- Working on switchgear within a heavy current switchboard
- Verifying the correct fault-level for the heavy current switchboard is equal to, or greater than the available prospective fault current, consistent with the kA rating of the equipment.
- Verify that the heavy current switchboard nominated separation (form) is correct
- Determining the earth fault loop impedance requirements necessary to keep touch voltage values within requirements
- Reporting skills to document non-compliances in accordance with enterprise procedures
- Reading and interpreting standards
- Solve problems in managing unexpected situations

### **Knowledge:**

- Electrical safe practices of working safely on or around electrical equipment
- Types and applications of switchgear and control gear
- Interlocking systems encompassing:
  - External interlocking systems
  - Internal interlocking systems
- Control and protection of switchgear and control gear
- Installation requirements encompassing operating systems for equipment
- Electrical switchgear and control gear protection methods encompassing:
  - An understanding of the operation of the switchgear when it opens under load

- An understanding of the settings and operation required for magnetic, short-circuit thermal overload and instantaneous protective devices and coordination with equipment
- Time/current curves from manufacturer's specifications
- Effectiveness of arc suppression installed within the equipment
- Modern types of switchgear that are computer controlled and programmed
- Modern types of switchgear that are interconnected to other protected devices
- Phase-failure systems
- Automatic transfer switch and manual transfer switch requirements, including location, design & operation
- Busbar & supports
- Earthing arrangements

### **RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

#### ***OH&S requirements***

include, but are not limited

- legislation
- personal protective equipment
- material safety management systems
- hazardous substances and dangerous goods code
- local site induction operation procedures
- awards provisions

#### ***Environmental requirements***

include, but are not limited to:

- liquid waste
- solid waste
- gas, fume, vapour, smoke emissions, including fugitive emissions
- excessive energy and water use
- excessive noise
- 

#### ***Appropriate personnel***

include, but are not limited to:

- project officer
- supervisor
- leading hand
- foreman
- manager
- site engineer
- trainer
- mentor
- teacher
- team member
- Consultant
- Electrical worker
- Registered electrical contractor

***Resources*** include, but are not limited to:

- The current version of:
  - Occupational Health & Safety Act (Vic)
  - Electricity Safety Act

- Electricity Safety (Installations) Regulations
- AS/NZS3000 Wiring Rules
- AS/NZS3008.1.1 Selection of Cables
- AS/NZS 3439 Series LV switchgear
- AS/NZS 61439 Series LV switchboards
- AS/NZS4836 / Code of Practice for Safe Electrical Work – (Low Voltage Electrical installations)
- other references and text as required

**Test equipment** includes, but is not limited to:

- Personal protective equipment (PPE) such as, but not limited to -
  - HV safety gloves
  - safety glasses
  - hard hat
  - cotton Overalls/long sleeved cotton shirt and cotton trousers
- insulation resistance & continuity tester
- multimeter & ammeter
- voltage tester
- independent earth reel & spike
- high voltage insulation mat

**Relevant procedures** include, but are not limited to:

- the use of tools and equipment
- instructions, plans, drawings and designs
- reporting and communication
- manufacturers' specifications and operational procedures

**Regulatory requirements** include, but are not limited to:

- Applicable resources, such as:
  - AS/NZS Standards
  - Codes of Practice
  - Legislation and regulations
  - Industry guidelines

## **EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

**Critical aspects for assessment and evidence required to demonstrate competency in this unit**

- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.
- In particular, this must incorporate evidence that shows as candidate is able to:
  - a) implement Occupational Health and Safety workplace

procedures and practices including the use of risk control measures as specified in the performance criteria and range;

- b) demonstrate essential knowledge and associated skills as described in this unit;
- c) demonstrate a representative body of performance within a timeframe typically expected of the discipline, work function and industrial environment;
- d) and conduct more than one inspection and testing tasks on electrical equipment and associated wiring installed in heavy current switchboards in a real or simulated workplace environment.

**Context of and specific resources for assessment**

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered by this unit.

**Method of assessment**

- Evidence can be gathered through a variety of ways, which may include:
  - observation of processes and procedures;
  - oral and/or written questioning on required knowledge and skills;
  - testimony from supervisors, colleagues, clients and/or other appropriate persons;
  - inspection of the final product or outcome; and
  - a portfolio of documentary on-site work evidence
  - demonstration of practical skills in either a real or simulated workplace environment
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

VU21943

Investigate incidents involving minor electric shock

Unit Descriptor

This unit provides the skills and knowledge required by Electricity Inspectors who are called upon to investigate the cause(s) of minor electric shocks.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Employability Skills

This unit contains Employability Skills.

Application of the Unit

The skills and knowledge contained within this unit would be applied by a licensed electrical inspector investigating the cause(s) of minor electric shock at the request of a customer.

ELEMENT

PERFORMANCE CRITERIA

1. Prepare to conduct an electric shock investigation

- 1.1 Details of the electric shock incident are confirmed with the victim, witnesses and/or relevant documentation
- 1.2 Relevant **OH & S** and **environmental requirements** for conducting electric shock investigation work are determined
- 1.3 Risk control measures relating to electrical inspection work are determined
- 1.4 Reporting requirements for the outcomes of electric shock investigations are clarified
- 1.5 **Personal protection equipment** required for conducting an electric shock investigation is obtained and checked
- 1.6 A strategy for conducting electrical investigation work is developed and applied in consultation with **key stakeholders**

2. Conduct an electric shock investigation

- 2.1 Key stakeholders are consulted before conducting the inspection
- 2.2 Relevant OH & S and environmental requirements for conducting the electrical inspection work are applied
- 2.3 Appropriate risk control measures are implemented to ensure the work area is safe for electrical inspection
- 2.4 The cause(s) of the electric shock is identified and documented in accordance with **regulatory requirements**
- 2.5 Verification that the work area is made safe is confirmed with key stakeholders
- 2.6 Relevant inspection report is made and issued to the regulator, in accordance with regulatory requirements, and to other stakeholders, as required



## **REQUIRED SKILLS AND KNOWLEDGE**

*This describes the essential skills and knowledge and their level, required for this unit*

### **Skills:**

- Communicating with key stakeholders
- Sourcing and analysing information relating to the electric shock incident
- Determining the scope of the electrical inspection work in relation to the investigation
- Implementing risk control measures to ensure that the electrical work is safe for inspection
- Organising tasks within the framework of an electric shock investigation
- Solving problems in order to manage unexpected situations
- Reporting skills to document non-compliances in accordance with regulatory requirements
- Reading and interpreting relevant AS/NZS Standards
- Analysing and identifying causes of electric shock in electrical installations

### **Knowledge:**

- Victorian Service & Installations Rules
- Electricity Safety Act 1998
- Electricity Safety (Installation) Regulations
- Licensing requirements for Electrical Inspectors
- Regulatory requirements for reporting outcomes of electric shock inspections
- Occupational health and safety requirements when working with electricity
- Awareness of technical standards, regulations and codes for general electrical installations
- Awareness of electrical safe work practices
- Causes and effects of an electric shock in relation to return paths and contact points
- Effect of electric shock on:
  - the human body
  - livestock
- Earthing systems
  - Multiple earth neutral system
  - Distributor earthing
  - Customer earthing
- Personal protection equipment
- Connection issues
- Equipotential bonding
- Investigation procedures including:
  - Risk assessment
  - Understanding the problem
  - Medical attention
  - Shock site testing
  - Using a remote earth
  - Testing appliances and circuits
  - Tests at main switchboard
  - Retesting after repairs
  - Determining various parameters such as earth impedance, neutral and earth currents
  - reporting



## RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

***OH & S requirements*** include, but are not limited to:

- Legislation
- Personal Protective equipment including LV, HV & arc flash.
- Material safety management systems
- Hazardous substances and dangerous goods code
- Local site inductions procedures

***Environmental requirements*** include, but are not limited to:

- Liquid waste
- Solid waste
- Gas, fume, vapour, smoke emissions, including fugitive emissions
- Excessive energy and water use
- Excessive noise

***Personal protective equipment*** includes, but is not limited to:

- LV safety gloves
- HV safety gloves
- Safety glasses
- Hard hat
- Cotton overalls/long sleeved cotton shirt and cotton trousers

***Key stakeholders*** may include, but are not limited to:

- Supervisor
- Leading hand
- Foreman
- Manager
- Site engineer
- Project manager/Manager
- Customer
- Consultant
- Electrical worker
- Electrical contractor
- Team member

***Regulatory requirements*** may include, but are not limited to:

- Applicable resources, but not limited to:
  - Electricity Safety Act 1998
  - Electricity Safety (Installation) Regulations
  - AS/NZS Standards
  - AS Standards
  - Codes of Practice
  - Legislation and regulations
  - Industry guidelines



### EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

#### **Critical aspects for assessment and evidence required to demonstrate competency in this unit**

- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge.
- In particular, this shall incorporate evidence that shows a candidate is able to:
  - Implement occupational health and safety workplace procedures and practices including the use of risk control measures appropriate to the electrical investigation;
  - Collect and analyse information pertaining to the electric shock incident;
  - Identify and consult with key stakeholders in relation to the minor electrical shock inspection work
  - Identify and document non-compliances with regulatory requirements in the electrical investigation
  - Document the outcomes of the electrical inspection in accordance with regulatory requirements

#### **Context of and specific resources for assessment**

- This unit may be assessed on-the-job, off-the-job or a combination of both on and off-the-job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used, where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all information, tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
- The competencies covered by this unit would be demonstrated by an individual working alone.

#### **Methods of assessment**

- Assessment of this unit must include demonstration of practical skills and may also include:
  - Oral or written questions
  - Written assignments
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered in this unit.

**VU21945**

**Produce electrical inspection reports**

**Unit Descriptor**

This unit of competency sets out the knowledge and skills required to produce reports for electrical safety investigations as required from time to time by electrical safety regulators. It includes the collection and analysis of information and production of a report.

**Employability Skills**

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

This unit contains Employability Skills

**Application of the Unit**

The skills and knowledge contained within this unit would normally be applied by a licensed electrical inspector at the request of the electrical safety regulator.

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Establish reporting requirements

- 1.1 Purpose or objective of the **report** is clearly defined and confirmed with the client.
- 1.2 Scope and nature of information requirements are identified
- 1.3 Requirements for information entry, storage, output and quality of document production are established

2 Collect and analyse information

- 2.3 Relevant **OHS requirements** for a given work area are obtained and clarified
- 2.4 A systematic information collection plan is designed to optimise the process
- 2.5 Information is collected in consultation with appropriate person(s) and consistent with regulatory requirements
- 2.6 Report is developed in collaboration with all relevant personnel
- 2.7 Information is checked to confirm its accuracy, relevance and status
- 2.8 Information is sorted, documented and prepared for the analytical process
- 2.9 Conclusions and findings reached are logical and based on objective analysis of the available information

**REQUIRED SKILLS AND KNOWLEDGE**

This describes the essential skills and knowledge and their level, required for this unit

**Skills**

- adjust the written communication to suit situation
- apply an appropriate written communication technique to relevant situations
- read, analyse and interpret sources of the required information
- check and confirm with reliable sources, the accuracy and relevance of information
- check what extra information is needed and finding it where appropriate
- sort information into a logical sequence
- analyse the conclusions made that they are clearly based on the information obtained
- record accurate, clear and objective information
- present material using technology as required (e.g. word processing, digital photographs)
- recognise the urgency and high risk components of specific reports
- handle and store information securely and safely



## Knowledge

- regulations and standards
- relevant policies, procedures, guidelines and requirements for report writing
- correct format, language and form required by the client
- basic written communication techniques, including barriers to effective communication
- protocols and procedures for communicating in writing with others
- rules of evidence
- security of information, freedom of information and confidentiality of information
- relevant cultural practices within organisations and the community
- identification of discriminative language
- technical and professional language used in the safety sector
- legislation and statutory obligations of reporting in own state or territory

## RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

**Report** may include, but are is not limited to:

- Incident reports
- Witness reports
- Routine reports
- Occupational health & safety reports

**OH&S requirements** include, but are not limited to:

- Legislation
- Protective equipment
- Material safety management systems
- Hazardous substances and dangerous goods code
- Safe operation procedures

**Legislative requirements** may include, but are not limited to:

- Confidentiality
- Authorised access to, or use of information
- Freedom of information
- Protection of privacy
- Data protection and the storage and security of information
- Use of information technology and other electronic or telecommunication systems

**Technology** may include, but is not limited to:

- word processing
- digital photography

### EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

#### **Critical aspects for assessment and evidence required to demonstrate competency in this unit**

- Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.
- In particular, this shall incorporate evidence that shows a candidate is able to:
  - Locate, interpret and apply information;
  - Apply safety requirements throughout the work sequence
  - Demonstrate steps and stages covering confirmation of objective, planning, information collection and analysis, and reporting performance;
  - Complete one to two page technical reports typical of those required by an electrical safety regulatory body;
  - Work effectively with others;
  - Demonstrate technical writing and presentation techniques.

#### **Context of and specific resources for assessment**

- This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:
- OHS policy and work procedures and instructions.
- Suitable simulated work environment, facilities, equipment and materials to undertake work as prescribed in this unit.
- The resources used for assessment should reflect current industry practices in relation to compiling and producing a report.
- These should be used in the formal learning/ assessment environment. This unit should be assessed off the job.
- The simulated conditions for assessment must be authentic and as far as possible reproduce and replicate the workplace
- The candidate should have access to all relevant tools and equipment materials and documentation required.
- The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

- Method of assessment**
- Evidence can be gathered through a variety of ways including:
    - Knowledge testing and simulation exercises
    - Knowledge tested or inferred from explanations and performance in workplace applications
    - Observation of performance in workplace activities in a range of interactions
    - Workplace reports produced for a client
    - Observation and documentation from assignments based on typical work requirements
    - observation of processes and procedures;
    - oral and/or written questioning on required knowledge and skills;
    - testimony from supervisors, colleagues, clients and/or other appropriate persons;
    - inspection of the final product or outcome
    - a portfolio of documentary evidence.
  - Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

VU21946

**Inspect, test and administer hazardous electrical installations**

**Unit Descriptor**

This unit of competency sets out the knowledge and skills required to safely perform the visual inspection and testing of electrical equipment, installed in a hazardous area and electrical equipment associated with the protection of a hazardous area, but not installed within the hazardous area.

Attainment of this unit allows a suitably qualified person to apply for licensing as an electrical inspector, for inspection of hazardous areas electrical work, subject to any other requirements demanded by the regulatory authority.

*The Specialist electives can only be undertaken after a "G" Class Electrical Inspection licence has been issued and validated by ESV or after the "G" Class core and elective units have been successfully completed.*

**Employability Skills**

This unit contains Employability Skills

**Application of the Unit**

The skills and knowledge contained within this unit would normally be applied by a licensed electrical inspector testing electrical installations in hazardous areas.

**ELEMENT**

1. Prepare for inspection and testing

**PERFORMANCE CRITERIA**

- 1.1 Relevant OHS policies and procedures for preparing to work in a hazardous area are followed
- 1.2 Type of inspection is ascertained from the **regulatory requirements** or discussions with **appropriate personnel** for the hazardous area
- 1.3 Hazardous area electrical installation details are ascertained from hazardous area records/dossier
- 1.4 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with appropriate personnel
- 1.5 Procedures for determining whether a given hazardous area is safe to conduct electrical testing are clarified
- 1.6 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site
- 1.7 Necessary work permits are obtained from appropriate personnel in accordance with regulatory requirements, where applicable
- 1.8 **Resources**, tools and the suitability of **test equipment** needed for the task are obtained in accordance with relevant procedures and checked for correct operation and safety

2. Conduct inspection and

- 2.1 OH&S policies and procedures with regards to explosion-



- testing
- 2.2 protection technique are followed
- 2.2 Defects that may affect the integrity of the explosion-protected equipment and wiring system are identified
- 2.3 Equipment, systems and installation are inspected and tested for compliance with the design specifications retained in hazardous records/dossier and in accordance with regulatory requirements
- 2.4 After the inspection and testing of each item, equipment parts and circuit connections are replaced in a manner that ensures the integrity of the explosion-protection system
- 2.5 **OH&S requirements** for work completion are followed
3. Document and take action on inspection outcomes
- 3.1 Defects are identified with reference to appropriate clauses in appropriate standards and documented in accordance with regulatory requirements.
- 3.2 Defects are documented and actions taken in accordance with the scope of inspection responsibilities to satisfy regulatory requirements
- 3.3 Work site is made safe in accordance with established safety procedures
- 3.4 Relevant inspection report is made and issued to customer, licensed electrical worker and regulator in accordance with regulatory requirements

## **REQUIRED SKILLS AND KNOWLEDGE**

### **Skills**

- Organise a sequence of tasks to maximum benefit
- Select correct tools and equipment for electrical installations testing
- Conduct inspection and mandatory tests on electrical installations following safe procedures
- Interpret wiring diagrams
- Solve problems in managing unexpected situations
- Reporting skills to document non-compliances in accordance with enterprise procedures
- Reading and interpreting standards

### **Knowledge:**

#### **Electrical apparatus in hazardous areas to include:**

- properties of gases as defined in AS/NZS 60079 Series
- properties of dusts as defined in AS/NZS 61241 Series
- electrical apparatus as ignition source
  - arcs
  - sparks
  - hot surfaces

#### **Explosion risk assessment through classification of hazardous areas**

- requirements of AS/NZS 3000
- determination of legal responsibilities
- classification process based on AS/NSZ 60079 and AS/NZS 61241
- definitions of six classification zones
- plant verification dossier



**Protection methods and techniques and method of marking for the following electrical apparatus certified for use in hazardous areas:**

- flameproof (Ex 'D') as defined in AS/NZS60079.0 and AS/NZS60079.1
- increased safety (Ex 'E'), as defined in AS/NZS 60079.0 and AS/NZS 60079.7
- intrinsically safe (Ex 'I') as defined in AS/NZS60079.0 and AS/NZS60079.11 pressurisation (Ex 'P') as defined in AS/NZS60079.0 and AS/NZS60079.2 sand filled (Ex 'Q') as defined in AS/NZS60079.0 and AS/NZS60079.5
- oil immersed (Ex 'O') as defined in AS/NZS60079.0 and AS/NZS60079.6 encapsulation (Ex 'M') as defined in AS/NZS60079.0 and AS/NZS60079.18 non sparking (Ex 'n') as defined in AS/NZS60079.0 and AS/NZS60079.15
- pressurisation (dusts Ex 'PD') as defined in AS/NZS61241.0 and AS/NZS61241.4
- encapsulation (dusts Ex 'MD') as defined in AS/NZS61241.0 and AS/NZS61241.18 enclosure
- protection (dusts Ex 'TD') as defined in AS/NZS61241.0 and AS/NZS61241.1 special protection (Ex 'S') as defined in AS1826
- ventilation (Ex 'V') as defined in AS1482
- mixed techniques (no specific symbol) marked as per AS/NZS60079.0

**Precautions when utilising fixed and portable gas detectors based on AS/NZS61779 requirements.**

**Inspection and testing process in Sections 4 and 5 of AS/NZS (and AS) 2381 group of standards and AS/NZS3000, Section 6**

**RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

***Regulatory requirements include, but are not limited to:***

- Applicable resources, such as:
  - Electricity Safety Act
  - Electricity Safety (Installations) Regulations
  - Victorian Distributors Service and Installation Rules
  - AS/NZS3010 combustion engine generator sets
  - AS4509 Series Standalone Power Systems
  - AS3011 Battery systems
  - AS/NZS 3000 – Wiring Rules including amendments
  - AS/NZS 3008.1.1– Electrical Installations-Selection of cables
  - AS/NZS 4777.1 – Grid connection of energy systems via Inverters – Installation requirements
  - AS/NZS 4777.2 – Grid connection of energy systems via Inverters – Inverter requirements
  - AS/NZS 4777.3 – Grid connection of energy systems via Inverters – Grid protection requirements
  - AS/NZS 5033 – Installation of photovoltaic (PV) arrays



**Appropriate personnel** include, but are not limited to:

- Project officer
- Supervisor
- Leading hand
- Foreman
- Manager
- Site engineer
- Trainer
- Mentor
- Teacher
- Team member
- Electrical worker
- Registered electrical contractor

**Resources** include, but are not limited to:

- Other relevant standards and the current version of:
  - Occupational Health & Safety Act (VIC) Section 25
  - Electricity Safety Act
  - Electricity Safety (Installations) Regulations
  - AS/NZS3000 Wiring Rules
  - AS2381 Series
  - AS/NZS2381.1
  - Applicable standards of the AS/NZS60079 Series
  - Applicable standards of the AS/NZS61241 Series
  - HB13 Handbook
  - AS/NZS4836 / Code of Practice for Safe Electrical Work (Low Voltage Electrical installations)
  - Licensed Electrical Inspectors Manual: *Inspection and testing of electrical installation work*
  - ESV defect list
  - Unit learning resources

**Test equipment** includes, but is not limited to:

- Personal Protective Equipment (PPE), such as:
  - Safety glasses
  - Hard hat
  - Cotton overalls/long sleeved cotton short and cotton trousers
  - Safety footwear
- insulation resistance tester
- multimeter
- voltage tester
- independent earth reel & spike
- high voltage insulation mat

**OH&S requirements** include, but are not limited to:

- Legislation
- Protective equipment
- Material safety management systems
- Hazardous substances and dangerous goods code
- Local safe operation procedures
- Awards provision

## **EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

### **Overview of assessment**

- Competency in this unit cannot be claimed until four on-site or simulated work inspections in the hazardous field of the Electrotechnology industry have been carried out and verified by an electrical inspector, who is licensed to carry out such inspection work.

### **Critical aspects for assessment and evidence required to demonstrate competency in this unit**

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.

In particular, this shall incorporate evidence that shows that a candidate is able to:

- implement occupational health and safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range;
- demonstrate essential knowledge and associated skills as described in this unit;
- demonstrate a representative body of performance within a timeframe typically expected of the discipline, work function and industrial environment; and conduct a minimum of four on-site or simulated inspections and testing tasks on electrical equipment and associated wiring installed in a hazardous area installation
- interpret, document and report outcomes from the inspection and testing of electrical equipment and associated wiring that is installed in a hazardous area installation.

### **Context of and specific resources for assessment**

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials

**Method of assessment**

- Evidence can be gathered through a variety of ways including:
  - observation of processes and procedures;
  - oral and/or written questioning on required knowledge and skills;
  - testimony from supervisors, colleagues, clients and/or other appropriate persons;
  - inspection of the final product or outcome; and
  - portfolio of documentary on-site work evidence.
  - demonstration of practical skill in either real or simulated workplace environment.
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

**VU21947**

**Inspect, test and administer high voltage installations**

**Unit Descriptor**

This unit of competency sets out the knowledge and skills required to safely perform the inspection and testing of high voltage installations, except high voltage wiring and equipment that is:

- associated with electrical discharge lighting systems, or
- associated with X-ray equipment, or
- within self-contained equipment supplied at low voltage.

Attainment of this unit allows a suitably qualified person to apply for licensing as an electrical inspector subject to any other requirements demanded by the regulatory authority.

*The Specialist electives can only be undertaken after a "G" Class Electrical Inspection licence has been issued and validated by ESV or after the "G" Class core and elective units have been successfully completed.*

**Employability Skills**

This unit contains Employability Skills.

**Application of the Unit**

The skills and knowledge contained within this unit would normally be applied by a licensed electrical inspector testing high voltage electrical installations.

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Plan to conduct inspection and testing

- 1.1 **OH&S** and **environmental requirements** for a given work area are obtained and clarified
- 1.2 Established OH&S requirements and risk control measures and procedures are followed in preparation of the work area
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with **appropriate personnel**
- 1.4 Inspection and testing requirements are determined from documentation, job sheets or discussions with appropriate personnel
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site
- 1.6 Necessary work permits are obtained from appropriate personnel in accordance with **regulatory requirements**, where applicable
- 1.7 Certification certificates are obtained from manufacturers, where applicable
- 1.8 **Resources**, tools and **test equipment** needed for the task are obtained in accordance with **enterprise procedures** and checked for correct operation and safety

2. Conduct compliance inspection and testing

- 2.1 Relevant OH&S requirements for carrying out the work are followed
- 2.2 The need to test for live is determined in strict accordance with OH&S requirements and conducted within established safety procedures
- 2.3 Equipment/machines/plant is checked as being isolated where

- necessary in strict accordance with OH&S requirements and industry code of practice
- 2.4 Detailed inspection and testing of equipment, wiring and protection systems within high voltage areas is conducted in accordance with regulatory requirements
  - 2.5 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes and discussed with appropriate personnel
3. Document and take action from inspection outcomes
    - 3.1 OH&S requirements for work completion are followed
    - 3.2 Non-compliance defects are identified with reference to appropriate clauses in regulatory standards and documented in accordance with regulatory requirements
    - 3.3 Non-compliant defects are documented and actions taken in accordance with the scope of inspection responsibilities to satisfy regulatory requirements
    - 3.4 Work site is made safe in accordance with established safety procedures
    - 3.5 Relevant inspection report is made and issued to customer, electrical contractor and regulator in accordance with regulatory requirements

## **REQUIRED SKILLS AND KNOWLEDGE**

### **Skills**

- Organise a sequence of tasks to maximum benefit
- Select correct tools and equipment for electrical installations testing
- Conduct inspection and mandatory tests on electrical installations following safe procedures
- Interpret wiring diagrams
- Solve problems in managing unexpected situations
- Reporting skills to document non-compliances in accordance with enterprise procedures
- Reading and interpreting standards

### **Knowledge:**

#### **Preparation for testing and inspection**

- where applicable, appropriate work permit is obtained
- preparation of the work site for inspection and testing
- risk assessment and management of work
- notification to other personnel on work-site that inspection and testing is to be carried out
- selection and checking of equipment and tools
- OH&S policies, work procedures and relevant instructions
- Inspection and testing of electrical wiring and associated fixed electrical equipment installed in high voltage areas
- “testing for live” procedure, in accordance with OH&S and regulatory requirements
- Correct operation of the insulation resistance tester
- Plans and specifications of high voltage installation

#### **Inspection of high voltage areas to include:**

- site conditions conform to approved drawings
- type of enclosure – e.g. wire fence, building, kiosk type enclosure
- fire rated construction of sub-station (where applicable)
- number of exit facilities from enclosure

- accessibility to authorized personnel only
  - direction of door openings for egress of authorised personnel
  - size of openings for access to enclosure
  - external labelling – safety signs
  - substation and main switchboard layouts
  - clearances around transformers and switchgear
  - minimum of two outward opening exits
  - external labelling – Danger notices.
  - fire protection and ratings
  - outdoor substation and switch room enclosures of approval type
  - containment of liquid dielectrics
  - clearances for safety purposes
  - certification certificates are sighted
  - control of incoming supply
  - control and protection of outgoing circuits
  - circuit protection settings of main protective devices
  - high voltage switchgear
  - cable installations – overhead and underground
  - minimum current carrying capacity of cables
  - prospective fault-current levels of cable ratings
  - provision of automatic fire-extinguishing equipment
  - step and touch potential of conductive surfaces
  - earth connections to all accessible exposed conductive parts containing or supporting high voltage conductors
  - earth of all parts connected to the accessible exposed conductive parts containing or supporting high voltage conductors
  - earth connections metal substation enclosures
  - earthing of high and low voltage surge diverters
  - earthing of metallic cable sheaths
  - earthing of low voltage neutral conductors
  - bonding to the underground water piping system
  - earthing of all floor and wall reinforcing and gradient rings
  - earth terminal bars
  - earthing of terminal bars in other substations
  - identify type of earthing system - combined or separate earthing system
  - minimum number of earthing connections to general mass of earth for each earthing system
  - labelling of common earth bar
  - arrangement of common earth bar
  - size of common earth bar
  - minimum clearances of high voltage and low voltage earthing systems
  - minimum size of high voltage earthing conductors
  - low voltage neutral and earthing conductors in substations
  - minimum size of the conductor used to connect the low voltage neutral terminal or bar to the neutral terminal of the transformer
- 
- minimum size of the conductor used to connect the transformer neutral to the earth terminal bar
  - minimum size of conductors used for connection to earth electrodes

### Testing to include:

- resistance of earthing.
- combined earthing system – not greater than 1  $\Omega$

- separate earthing systems
- high voltage system – not greater than 30  $\Omega$
- low voltage system:
  - Transformer rating up to 50kVA – 30  $\Omega$
  - Transformer rating above 50kVA but not more than 500kVA – 15  $\Omega$
  - Transformer rating above 500kVA – 10  $\Omega$
- insulation and high voltage tests 1 and 2 are carried out or witnessed and certified

**Documentation:**

- non-compliant defects documented and verified in accordance with regulatory requirements
- completion of appropriate inspection certification to satisfy regulatory requirements

**Reporting:**

- notification of appropriate personnel of non-compliant defects
- notification of the completion of the certificate of inspection to the Regulator as required by regulatory requirements

**RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

***OH&S requirements***

include, but are not limited to:

- legislation
- protective equipment
- material safety management systems
- hazardous substances and dangerous goods code
- local safe operation procedures
- awards provisions

***Environmental***

***requirements*** include, but are not limited to:

- high voltage
- liquid waste
- solid waste
- gas, fume, vapour, smoke emissions, including fugitive emissions
- excessive energy and water use
- excessive noise

***Appropriate personnel***

include, but is not limited to:

- project officer
- supervisor
- leading hand
- foreman
- manager
- site engineer
- trainer
- mentor
- teacher
- team member
- electrical worker
- registered electrical contractor

### **Regulatory requirements**

include, but are not:

- Applicable resources, such as:
  - AS/NZS Standards
  - Codes of Practice
  - Victorian Acts
  - Industry guidelines

**Resources** include, but are not limited to:

- The current version of:
  - Occupational Health & Safety Act (VIC)
  - Electricity Safety Act
  - Electricity Safety (Network Assets) Code
  - Electrical Safety (Installations) Regulations
  - Code of Practice on Electrical safety for the Distribution Business in the Victorian Electricity Supply Industry
  - Electrical safety for work on or near high voltage electrical apparatus (The Green/Blue Book)
  - AS 2067 Switchgear assemblies and ancillary equipment for AC voltages above 1kV
  - AS/NZS 3000 Wiring Rules
  - AS/NZS 3008.1.1 Selection of Cables
  - AS/NZS4836 / Code of Practice for Safe Electrical Work – (Low Voltage Electrical installations)
  - Victorian Service & Installation Rules (VSIR)
  - Licensed Electrical Inspector's Manual
  - EV defect list and other references and text, as required

**Test equipment** includes, but is not limited to:

- Personal protective equipment (PPE) such as:
  - HV Safety gloves
  - safety glasses
  - hard hat
  - cotton Overalls/long sleeved cotton shirt and cotton trousers
  - insulation resistance tester
  - multimeter
  - voltage tester
  - independent earth reel & spike
  - high voltage insulation mat

### **Enterprise**

**procedures** include, but are not limited to:

- the use of tools and equipment
- instructions, including job sheets, cutting lists, plans, drawings and designs
- reporting and communication
- manufacturers' specifications and operational procedures

## **EVIDENCE GUIDE**

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

### **Overview of Assessment**

- Competency in this unit cannot be claimed until four on-site or simulated work inspections in the high



voltage field of the Electrotechnology industry have been carried out and verified by an electrical inspector who is licensed to carry out such inspection work.

### **Critical aspects for assessment and evidence required to demonstrate competency in this unit**

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.

In particular, this must incorporate evidence that shows a candidate is able to:

- Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures, as specified in the performance criteria and range;
- Demonstrate the essential knowledge and associated skills as described in this unit
- demonstrate a representative body of performance within a timeframe typically expected of the discipline, work function and industrial environment; and conduct a minimum of four on-site or simulated inspections and testing tasks on electrical equipment and associated wiring installed in a hazardous area installation
- interpret, document and report outcomes from the inspection and testing of electrical wiring and associated fixed electrical equipment installed in a high voltage installation.

### **Context of and specific resources for assessment**

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools and equipment required and be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
- The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team.
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered by this unit.

### **Method of assessment**

- Evidence can be gathered through a variety of ways including:
  - observation of processes and procedures;

- oral and/or written questioning on required knowledge and skills;
  - testimony from supervisors, colleagues, clients and/or other appropriate persons;
  - inspection of the final product or outcome; and
  - portfolio of documentary on-site work evidence
  - demonstration of practical skill in either real or simulated workplace environment.
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.

**VU21948**

**Inspect, test and administer medical installations**

**Unit Descriptor**

This unit of competency sets out the knowledge and skills required to safely perform the inspection and testing of electrical work on all or part of any fixed electrical equipment operated at any voltage installed in a patient area

Attainment of this unit allows a suitably qualified person to apply for licensing as an electrical inspector subject to any other requirements demanded by the regulatory authority

*The Specialist electives can only be undertaken after a "G" Class Electrical Inspection licence has been issued and validated by ESV or after the "G" Class core and elective units have been successfully completed.*

**Employability Skills**

This unit contains Employability Skills

**Application of the Unit**

The skills and knowledge contained in this unit would normally be applied by a licensed electrical inspector testing electrical installations in medical settings.

**ELEMENT**

**PERFORMANCE CRITERIA**

1. Plan to conduct inspection and testing

- 1.1 Relevant **OH&S** and **environmental requirements** for a given work area are obtained and clarified
- 1.2 Established OH&S requirements and risk control measures and procedures are followed in preparation of the work area
- 1.3 Safety hazards that have not previously been identified are documented and risk control measures devised and implemented in consultation with **appropriate personnel**
- 1.4 Inspection and testing requirements are determined from documentation, job sheets or discussions with appropriate personnel
- 1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the work site
- 1.6 **Resources**, tools and **test equipment** needed for the task are obtained in accordance with **enterprise procedures** and checked for correct operation and safety

2. Conduct compliance inspection and testing

- 2.1 OH&S requirements for carrying out the work are followed
- 2.2 Equipment not provided with alternative supply e.g. UPS, generator, etc. is identified
- 2.3 Equipment/machines/plant are checked as being isolated where necessary in strict accordance with OH&S requirements and industry code of practice
- 2.4 The need to test for live is determined in strict accordance with OH&S requirements and conducted within established safety procedures
- 2.5 Evidence that electrical equipment complies with safety requirements is sought from manufacturers and/or regulator and sighted, where deemed necessary
- 2.6 Detailed inspection and testing of the equipment, wiring

	and protection systems within patient areas as outlined in AS/NZS3003
	2.7 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes and discussed with appropriate personnel
Document and take action from inspection outcomes	2.8 Relevant OH&S requirements for work completion are followed
	2.9 Non-compliance defects are identified with reference to appropriate clauses in regulatory standards and documented in accordance with <b>regulatory requirements</b>
	2.10 Non-compliant defects are documented and actions taken in accordance with the scope of inspection responsibilities to satisfy regulatory requirements
	2.11 Work site is made safe in accordance with established safety procedures
	2.12 Relevant inspection report is made and issued to customer, electrical contractor and regulator in accordance with regulatory requirements

## REQUIRED SKILLS AND KNOWLEDGE

Application of this unit requires specific knowledge of regulations and standards. These are given in the table. Assessors should gather evidence to show that sufficient knowledge and skills have been acquired to safely and methodically prepare, conduct and report the detailed inspection and testing of electrical wiring and associated fixed electrical equipment installed in body-protected or cardiac-protected electrical areas of patient treatment areas

Specific knowledge and skills required:

### Skills:

- Organise a sequence of tasks to maximum benefit
- Select correct tools and equipment for electrical installations testing
- Conduct inspection and mandatory tests on electrical installations following safe procedures
- Interpret wiring diagrams
- Solve problems in managing unexpected situations
- Reporting skills to document non-compliances in accordance with enterprise procedures regulatory requirements
- Reading and interpreting standards

### Knowledge:

Preparation for inspection and testing:

- risk assessment and management of work
- preparation of the work site for inspection and testing
- notification to other personnel on work-site that inspection and testing is to be carried out
- selection and checking of equipment and tools
- OH&S policies, work procedures and relevant instructions
- inspection and testing of electrical wiring and associated fixed electrical equipment installed in body-protected or cardiac-protected electrical areas of patient treatment areas

- 'testing for live' procedures in accordance with OH&S and regulatory requirements
- correct operation of test equipment
- inspection procedures in accordance with regulatory requirements
- testing procedures in accordance with regulatory requirements

Inspection of general areas to include:

- verification of signs marking patient areas
- socket outlets (LPD and non-LPD protected)
- colour coding, marking and indicator lights
- permanently wired medical electrical equipment
- additional points within patient area leakage protection devices (LPD) are accessible
- non LPD outlets correctly located
- alternate supplies are LPD protected
- RCD protected supply - type 1 RCD
- discrimination between RCD's
- maximum number of socket outlets protected by RCD
- non-patient area socket outlets separately protected
- RCD's have supply available indicator
- equipment mounted RCD accessible for testing
- transformer isolated supply
- isolation transformers comply with regulatory standards
- isolating transformer installed to manufacturer's requirements
- individual isolating transformer for patient location
- current setting of overload alarm monitor is marked
- over-current protection device correctly sized
- verify prospective hazard current rating
- verify number of points connected to transformer isolated supply
- isolating transformer supplying permanent equipment have provision for monitoring prospective hazard current
- permanently wired appliances and socket outlets off a common LPD protected supply switch all live conductors
- all marking is visible, legible, durable and indelible

Inspection of cardiac-protected areas to include:

- extra low voltage supplies comply with AS/NZS3000 and are earth free
- earthing complies with AS/NZS3000
- verify one only equipotential junction (EPJ)  
equipotential earthing is connected to the EPJ junction
- earthed terminals of permanently connected class I equipment meet the requirements of AS/NZS3003
- all connections within the equipotential earthing system do not depend on single earthing screw
- connection between EPJ and the main/sub-main earthing conductors
- EPJ is marked
- number and disposition of terminals
- EP terminals isolated from structural metal

Inspection of body-protected areas to include:

- earthing complies AS/NZS3000
- where applicable, home dialysis installations comply with body-protected areas.

Testing of cardiac-protected areas to include:

- EP system not to exceed  $0.1\Omega$
- potential difference between earth point, earth contacts of socket outlets, conductive parts of permanent equipment and building services within the patient environment and

- EPJ not to exceed 50mV
- EPJ and earthing terminals of socket outlets and EP terminals requiring LPD protection, does not exceed  $0.1\ \Omega$
- EPJ and earth terminals of permanently connected Class I and Class II equipment, electrically conductive wiring enclosures, wiring not protected by LPD's, enclosures in contact with structural metal and non-electrical fittings accessible in the patient environment, does not exceed  $0.1\ \Omega$
- connections between EPJ and permanently connected Class I equipment from non-protected supply shall not exceed  $0.1\ \Omega$
- permanently connected Class II and Class III equipment, electrically conductive enclosures and non-electrical fitting within the patient environment connected to non-LPD protected points, shall not exceed  $0.1\ \Omega$

Testing of body-protected areas to include:

- earthing complies with AS/NZS3003
- RCD operation
- prospective hazard current on LIM installation
- accuracy of LIM meter, alarm set point and alarm system
- overload monitors for sensitivity and alarm reset

Documentation:

- non-compliant defects documented and verified through reference to current Australian/New Zealand standards
- Inspection and testing results documented for auditing purposes
- completion of appropriate inspection certification to satisfy regulatory requirements

Reporting:

- notify electrical contractor or electrical installation worker of non-compliant defects
- notification of the completion of the certificate of inspection to the Regulator as required by regulatory requirements

### RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording in the Performance Criteria is detailed below.

***OH&S requirements***

include, but are not limited

- legislation
- protective equipment
- material safety management systems
- hazardous substances and dangerous goods code
- local safe operation procedures
- awards provisions

**Environmental**

**requirements** include, but are not limited to:

- liquid waste
- solid waste
- gas, fume, vapour, smoke emissions, including fugitive emissions
- excessive energy and water use
- excessive noise

**Appropriate personnel**

include, but are not limited to:

- project officer
- supervisor
- leading hand
- foreman
- manager
- site engineer
- trainer
- mentor
- teacher
- team member
- electrical worker
- registered electrical contractor

**Regulatory requirements**

include, but are not limited to:

- Applicable resources, such as:
  - AS/NZS Standards
  - Codes of Practice
  - Legislation and regulations
  - Industry guidelines

**Resources** include, but are not limited to:

- The current version of:
  - Occupational Health & Safety Act (Vic)
  - Electricity Safety Act
  - Electricity Safety (Installations) Regulations
  - AS/NZS3003 Electrical installations – Patient Areas
  - AS/NZS4510 – Isolated electrical supply systems for medical use
  - AS/NZS2500 - Guide to the safe use of electricity in patient care.
  - AS/NZS3000 Wiring Rules
  - AS/NZS3008.1.1 Selection of Cables
  - AS/NZS4836 / Code of Practice for Safe Electrical Work – (Low Voltage Electrical installations)
  - AS/NZS3017 Guidelines to Electrical
    - Testing
  - Licensed Electrical Inspectors manual
  - ESV defect list and
  - other references and text as required

**Test Equipment** includes, but is not limited to:

- Personal protective equipment (PPE) such as, but not limited to -
  - safety glasses
  - hard hat
  - cotton Overalls/long sleeved cotton shirt
  - cotton trousers



- insulation resistance tester
- multimeter
- RCD tester

**Enterprise procedures** include, but are not limited to:

- the use of tools and equipment
- instructions, including job sheets, cutting lists, plans, drawings and designs
- reporting and communication
- manufacturers' specifications and operational procedures

### EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for this Training Package.

#### Overview of Assessment

- Competency in this unit cannot be claimed until four on-site or simulated work inspections in the medical field of the electro-technology industry have been carried out and verified by an electrical inspector who is licensed to carry out such inspection work.

#### Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and to be capable of applying the competency in new and different situations and contexts within the timeframes typically expected of the discipline, work function and industrial environment.

In particular, this must incorporate evidence that shows as candidate is able to:

- implement Occupational Health and Safety workplace procedures and practices including the use of risk control measures as specified in the performance criteria and range;
- demonstrate essential knowledge and associated skills as described in this unit;
- demonstrate a representative body of performance within a timeframe typically expected of the discipline, work function and industrial environment; and conduct a minimum of four on-site or simulated inspections and testing tasks on electrical equipment and associated wiring installed in a hazardous area installation.
- interpret, document and report outcomes from the inspection and testing of electrical wiring and associated fixed electrical equipment installed in body-protected or cardiac-protected electrical areas of hospitals and medical and dental practices.



### Context of and specific resources for assessment

- This unit may be assessed on the job, off the job or a combination of both on and off the job.
- Where assessment occurs off-the-job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations.
- The candidate will have access to all tools, equipment, materials and documentation required. The candidate will be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
- The skills covered by this unit would be demonstrated by an individual working alone or as part of a team.
- This unit could be assessed in conjunction with any other units covering electrical inspection or other units requiring the exercise of the skills and knowledge covered by this unit.

### Method of assessment

- Evidence can be gathered through a variety of ways including:
  - observation of processes and procedures;
  - oral and/or written questioning on required knowledge and skills;
  - testimony from supervisors, colleagues, clients and/or other appropriate persons;
  - inspection of the final product or outcome; and
  - portfolio of documentary on-site work evidence
  - demonstration of practical skill in either real or simulated workplace environment.
- Where performance is not directly observed and/or is required to be demonstrated over a period of time and/or in a number of locations, any evidence should be authenticated by colleagues, supervisors, clients or other appropriate persons.