

Title	Demonstrate and apply knowledge of testing switchboards		
Level	4	Credits	4

Purpose	<p>This unit standard is for people engaged in the manufacture of switchboards in the electrotechnology industry.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate knowledge of test equipment; – explain and apply switchboard inspection and testing methods; – demonstrate knowledge of anticipated results of switchboard tests; and – explain and apply knowledge of thermal imaging in switchboard testing.
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Classification	Electrical Engineering > Electric Switchboards
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Available grade	Achieved
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Explanatory notes

- 1 This unit standard may be used for learning and assessment for off-job or on-job.
- 2 References

Accident Compensation Act 2001;
 AS/NZS 3000:2007, *Electrical installations (known as the Australian/New Zealand Wiring Rules)*;
 AS/NZS 3439.4:2009, *Low-voltage switchgear and control gear assemblies – Particular requirements for assemblies for construction sites (ACS)*;
 Electricity Act 1992;
 Electricity (Safety) Regulations 2010;
 Health and Safety at Work Act 2015;
 The New Zealand Electrical Codes of Practice, available from [WorkSafe New Zealand](#);
 and all subsequent amendments and replacements.
- 3 Definitions

CT – Current Transformers.
HV – High Voltage.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
Safe and sound practice – this relates to the installation of electrical equipment and is defined in AS/NZS 3000:2007.
VT – Voltage Transformers.

4 Range

- a Candidates may refer to current legislation and Standards during assessment.
- b Demonstration of safe working practices and installation in accordance with *safe and sound practice* are essential components of assessment of this unit standard.
- c All evidence presented for assessment against this unit standard must be in accordance with:
 - i legislation;
 - ii policies and procedures;
 - iii ethical codes;
 - iv Standards (may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010);
 - v applicable site, enterprise, and industry practice; and
 - vi where appropriate manufacturers' instructions, specifications, and data sheets.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of test equipment.

Range test equipment may include – insulation tester, HV tester, current injection test set, ductor set, polarity test set, ohm-metre;
evidence of three types of test equipment is required.

Evidence requirements

- 1.1 Explain the purpose of each piece of equipment.
- 1.2 Explain calibration needs and safety precautions appropriate to the use of each piece of equipment.
- 1.3 Explain and apply the appropriate method for each piece of equipment and explain the relation to specific test requirements.

Outcome 2

Explain and apply switchboard inspection and testing methods.

Evidence requirements

- 2.1 Explain the typical sequence of inspections and tests that provides efficiency and safety.

Range inspections – layout, busbars;
tests – CT, VT, wiring, insulation, potential, functional.
- 2.2 Explain and apply two methods of systematically testing the operating voltages of all circuits in a switchboard.
- 2.3 Explain and apply two methods of calibrating and testing circuit breakers.
- 2.4 Apply safe working clearances for high-voltage testing and operational testing.

- 2.5 Complete CT tests, polarity tests, and current injection tests and explain each test in terms of procedure and operation.
- 2.6 Use test voltages for common nominal switchboard voltages.
- 2.7 Provide a written or oral test report that outlines the results from the completed tests.

Outcome 3

Demonstrate knowledge of anticipated results of switchboard tests.

Evidence requirements

- 3.1 Describe typical tolerances for test results.
- 3.2 Explain flashover and/or puncture occurring during insulation and HV tests.
- 3.3 Explain reasons for acceptable pass/fail criteria for insulation tests carried out at the test voltages defined in relevant Standards and/or regulations.

Outcome 4

Explain and apply knowledge of thermal imaging for switchboards in a given situation.

Evidence requirements

- 4.1 Explain thermal imaging in terms of how it detects hot spots on the switchboard.
- 4.2 Explain the types of faults that may be detected with thermal imaging technology.
- 4.3 Operate and use thermal imaging equipment to survey an existing switchboard installation.
- 4.4 Provide a written or oral report that identifies and explains the potential faults and/or hot spots using the results from the survey.

Replacement information	This unit standard replaced unit standard 14978.
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Planned review date	31 December 2021
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	17 November 2016	N/A

Consent and Moderation Requirements (CMR) reference	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.