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

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| 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 – 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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Guidance Information

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 (version as cited in the Electricity (Safety) Regulations), *Electrical installations (known as the Australian/New Zealand Wiring Rules)*
 - AS/NZS 61439.4:2016, *Low-voltage switchgear and controlgear assemblies – Part 4: Particular requirements for assemblies for construction sites (ACS)*, available at [Standards NZ](https://standards.nz)
 - Electricity Act 1992
 - Electricity (Safety) Regulations 2010
 - Health and Safety at Work Act 2015
 - The New Zealand Electrical Codes of Practice, available at WorkSafe New Zealand, worksafe.govt.nz
- 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.

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
 - vi where appropriate manufacturers' instructions, specifications, and data sheets.

Outcomes and performance criteria**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.

Performance criteria

- 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.

Performance criteria

- 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.

Performance criteria

- 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.

Performance criteria

- 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.

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| Replacement information | This unit standard replaced unit standard 14978. |
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| Planned review date | 31 December 2026 |
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Status information and last date for assessment for superseded versions

| Process | Version | Date | Last Date for Assessment |
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| Registration | 1 | 17 November 2016 | N/A |
| Rollover and Revision | 2 | 25 July 2024 | N/A |

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| 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>.

Comments on this unit standard

Please contact the Waihanga Ara Rau Construction and Infrastructure Workforce Development Council qualifications@waihanga.nz if you wish to suggest changes to the content of this unit standard.