

Title	Demonstrate knowledge of switchboard circuits		
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"> – explain the functions of switchboard components and circuits; – use drafting software to draw a switchboard schematic diagram; and – explain the potential for electrical interference.
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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 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

a.c – alternating current.
 CAD – Computer Aided Drafting package.
 d.c – direct current.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
 PLC – Programmable Logic Controlled.
Safe and sound practice – this relates to the installation of electrical equipment and is defined in AS/NZS 3000:2007.

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

Explain the functions of switchboard components and circuits.

Range explanation must include use of a three-phase switchboard diagram of at least 500 amps capacity.

Evidence requirements

- 1.1 Identify and describe the functions of at least ten switchgear components.
- 1.2 Explain the functions of the main power distribution system, associated protective devices, and metering.
- 1.3 Demonstrate and explain how control circuits operate.

Range direct-on-line, electrical motor starters, electronic motor starters, PLC control of motor operation, timer control, lighting control; evidence of five different types of control circuits is required.

Outcome 2

Use drafting software to draw a switchboard schematic diagram.

Evidence requirements

- 2.1 Draw switchboard schematic diagrams to specification.

Range specification includes – three-phase motor starter with protection and two control devices; control devices may include but are not limited to – push button, timer, PLC.

- 2.2 Draw the diagram with symbols regularly and uncommonly used in the industry.
- 2.3 Ensure the diagram has sufficient detail to enable unique identification of all

items necessary for installation of the circuit in an enclosure.

Outcome 3

Explain the potential for electrical interference.

Evidence requirements

- 3.1 Explain the mechanisms of electrical interference on a.c. and d.c. voltage signals in terms of their effect on circuit performance.
- 3.2 Explain how to prevent common sources of electrical interference on low voltage signals with reference to the minimum installation requirements to eliminate interference.

Range sources – cable alignment, power cables, cable proximity, radio signals, switching devices.

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	31 August 1998	31 December 2013
Revision	2	12 March 2002	31 December 2013
Review	3	20 March 2008	31 December 2020
Rollover and Revision	4	15 March 2012	31 December 2020
Revision	5	15 January 2014	31 December 2020
Review	6	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 (CMRs). 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.