

Title	Demonstrate knowledge of busbar design		
Level	4	Credits	5

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 three different switchboard busbar sizes; – demonstrate knowledge of busbar mounting and spacing methods; and – explain how busbar system design, location, and orientation can influence performance.
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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
 - Ampacity* – maximum amount of electric current a conductor or device can carry before sustaining immediate or progressive deterioration, also described as current rating.
 - Industry practice* – those practices that competent practitioners within the industry recognise as current industry best practice.
 - kA* – kilo amps.
 - 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

Demonstrate knowledge of three different switchboard busbar sizes.

Evidence requirements

- 1.1 Explain and calculate busbar ratings.
Range ampacity, voltage, fault level, de-rating, ambient temperature.
- 1.2 Explain four effects of incorrect busbars calculation and outline solutions.

Outcome 2

Demonstrate knowledge of busbar mounting and spacing methods.

Evidence requirements

- 2.1 Explain why a busbar may be insulated and describe situations where insulated busbars are required in accordance with industry practice.
- 2.2 Explain three types of fixings to ensure mechanical clearances between busbars.
- 2.3 Explain the process to determine the distance between busbar fixings in accordance with kA ratings.

Outcome 3

Explain how busbar system design, location, and orientation can influence performance.

Evidence requirements

- 3.1 Explain the influence of ampacity on busbar system design, location, and orientation.

- 3.2 Explain the influence of temperature rise on busbar system design, location, and orientation.
- 3.3 Explain performance under fault conditions on busbar system design, location, and orientation.
- 3.4 Explain the effects on spacing, fixing, sizing, cost, and rating of double and quad parallel busbars.

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	20 March 2008	31 December 2020
Rollover and Revision	2	15 March 2012	31 December 2020
Revision	3	15 January 2014	31 December 2020
Review	4	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.