

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 – 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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Guidance Information

- 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 (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

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 amperes.

Safe and sound practice – this relates to the installation of electrical equipment and is defined in AS/NZS 3000.

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 three different switchboard busbar sizes.

Performance criteria

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.

Performance criteria

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.

Performance criteria

- 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 2026
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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
Rollover and Revision	5	25 July 2024	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>.

Comments on this unit standard

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