Demonstrate knowledge of busbar systems design

Level **4**

Credits **10**

Purpose This unit standard is intended for the training and assessment of people engaged in the manufacture of electric switchboards and covers the knowledge and skill required to design busbars.

People credited with this unit standard are able to demonstrate knowledge of:
– switchboard busbar sizes;
– busbar mounting and spacing methods;
– the effects of temperature on busbars; and
– parallel busbar effects.

Subfield Electrical Engineering

Domain Electric Switchboards

Status Registered

Status date 20 March 2008

Date version published 20 March 2008

Planned review date 31 December 2013

Entry information Open.

Accreditation Evaluation of documentation and visit by NZQA and industry.

Standard setting body (SSB) ElectroTechnology Industry Training Organisation

Accreditation and Moderation Action Plan (AMAP) reference 0003

This AMAP can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Special notes

1 This unit standard has been designed for learning and assessment off-job.

2 References
Electricity Act 1992;
Electricity Regulations 1997;
AS/NZS 3000:2007 *Electrical installations (known as the Australian/New Zealand Wiring Rules)*;
New Zealand Electrical Codes of Practice (NZECP), ISSN 0114-0663 (available from Ministry of Economic Development);
and all subsequent amendments and replacements.

3 Definitions
Industry practice – practice used and recommended by organisations involved in the electrotechnology industry.
Switchboard – low-voltage switchgear and controlgear assemblies, the rated voltage of which does not exceed 1000 V a.c. at frequencies not exceeding 1000 Hz, or 1500 V d.c.

4 Range
All knowledge demonstrated is to be conducted in accordance with applicable specifications, documented enterprise, legislative and/or regulatory requirements, and local bylaws.

Elements and performance criteria

Element 1

Demonstrate knowledge of switchboard busbar sizes.

Range three different busbars specified on switchboard drawings provided by the assessor.

Performance criteria

1.1 The busbar ratings are calculated from the drawings and specification provided.

Range current, voltage, fault level, temperature, derating, ambient temperature.

1.2 The busbar sizes are calculated from the rating and according to specification and industry practice.

Element 2

Demonstrate knowledge of busbar mounting and spacing methods.

Performance criteria

2.1 The suitability of different fixing methods is described for two different applications.

2.2 Methods of maintaining busbar insulation integrity during mounting are explained.

2.3 Three methods of maintaining mechanical clearances between busbars are explained.

2.4 Methods for determining the distance between busbar fixings is described.

Element 3

Demonstrate knowledge of the effects of temperature on busbars.

Performance criteria

3.1 The variation of busbar electrical properties with temperature is described.

3.2 Heat dissipation methods used in switchgear assemblies are described.

Range methods may include but are not limited to – busbar orientation, busbar sizing.
Evidence of at least two methods is required.

3.3 The causes of heat generation in a busbar are described.

Element 4

Demonstrate knowledge of parallel busbar effects.

Performance criteria

4.1 The effect on electrical ratings of parallel busbars is explained.

Range parallel – horizontal, vertical.

4.2 Methods of compensating for parallel busbar effects and the use of reference materials and busbar specifications are described in accordance with busbar manufacturers' specifications.

Please note

Providers must be accredited by NZQA, or an inter-institutional body with delegated authority for quality assurance, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against unit standards.

Accredited providers and Industry Training Organisations assessing against unit standards must engage with the moderation system that applies to those standards.

Accreditation requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP 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 ElectroTechnology Industry Training Organisation connect@etito.co.nz if you wish to suggest changes to the content of this unit standard.