

1. Module details

Module name

Substations: Buswork and Isolators

Module duration

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 18 – 20 hours.

Module code

NUE246

Discipline code

0703130

2. Module purpose

This module provides the learner with the skills necessary to install and maintain the simpler components of an outdoor switchgear substation with emphasis on structural and mechanical aspects of the plant.

3. Prerequisites

NUE247 Install Panels, Wiring, Protection and Instrumentation.

4. Relationship to competency standards

This module addresses Unit 3.16 of the E.S.I. National Competency Standards for Overhead Line Work and Cable Jointing.

5. Content

Busbars

outdoor
bus support structures

Isolators

including motorised

Links

Principles of substation

earthing
earth grids

6. Assessment strategy

Assessment methods

Short answer questions (written, oral or graphic or computer based).
 Suitable practical exercises which assess the skills required of each learning outcome.

Conditions of assessment

Theory room for written tests together with practical field observation.
 Learners must demonstrate competence in all learning outcomes to the standard described by the assessment criteria and perform all activities in a safe manner in accordance with State Occupational Health and Safety Acts and Regulations, Codes of Practice and Work Procedures when applicable.

7. Learning outcome details

Learning outcome 1

Install a switchgear substation earth grid.

Assessment criteria

- 1.1 Excavate a trench.
- 1.2 Install earth rods, attach earth straps and connect to a grid.

Learning outcome 2

Install and maintain substation steel framework.

Assessment criteria

- 2.1 Prepare a worksite.
- 2.2 Conduct switching, isolation and earthing on apparatus.
- 2.3 Erect and brace steelwork and install equipment.

Learning outcome 3

Install and repair outdoor busbar systems.

Assessment criteria

- 3.1 Determine busbar requirements, shape and install busbars.
- 3.2 Install busbar fittings and putty and tape indoor connections.
- 3.3 Measure buswork resistance (using a ductor).
- 3.4 Measure buswork insulation resistance (using a megger).

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| Learning outcome 4 | Install and maintain substation isolator switches and links. |
| Assessment criteria | <p>4.1 Perform HV switching in accordance with current work instructions and procedures.</p> <p>4.2 Disconnect and reconnect HV cables and apparatus.</p> <p>4.3 Modify steelwork and other structures.</p> <p>4.4 Install specific isolator, check and test mechanical operation and commission.</p> |
| Learning outcome 5 | Identify safety hazards associated with the erection and use of scaffolding in a switchgear substation. |
| Assessment criteria | <p>5.1 Identify types of scaffolding and explain their uses, limitations and restrictions.</p> <p>5.2 Identify safety hazards.</p> <p>5.3 Generate a site visit report on scaffolding in a substation.</p> |
| 8. Delivery of the module | |
| Delivery strategy | <p>Delivery strategies must be suitable for both theoretical and/or practical learning and module purpose.</p> <p>It is recommended that learning and assessment be facilitated in a holistic manner which may require a learning sequence other than indicated in the body of this module descriptor.</p> |
| Resource requirements | <p>Enterprise substation construction manuals</p> <p>Enterprise substation maintenance manuals</p> <p>Relevant Australian standards</p> <p>Enterprise work manuals and standard instructions</p> <p>Relevant manufacturers' equipment manuals</p> <p>Electricity Supply Industry Acts and Regulations.</p> |
| Occupational health and safety requirements | <p>Learners should be made aware of Occupational Health and Safety issues in all situations and be expected to demonstrate safe working practices at all times. Electrical safety must be emphasised.</p> |