

**1. Module details**

**Module name**

**Electrical Systems Identification and Powerline Clearance Requirements**

**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**

NUE260

**Discipline code**

0703130

**2. Module purpose**

The purpose of this module is provide participants with the skills and knowledge required to identify Low and High Voltage electrical conductors, and powerline clearance requirement, relevant to the participants State/Territory for persons and equipment used when working around powerlines.

**3. Prerequisites**

NBB002 Occupational Health and Safety.  
NUE258 First Aid.

**4. Relationship to competency standards**

NES101, NES450, NES604

**5. Content**

**Identification of Low and High voltage electrical conductors and related equipment**

**Powerline Clearance distances for Low and High Voltage**

**Application of electrical conductor identification and powerline clearance requirements**

## 6. Assessment strategy

### Assessment methods

Learning Outcomes in this module may be tested using oral presentations, practical demonstrations in a safe non-energised environment, written work, and correct visual identification of electrical apparatus and application of powerline clearance distances. Learning and Assessment of module content takes an incremental approach building to application of skills and knowledge in Learning Outcome 9. This module can be delivered and assessed concurrently with other modules in the program and in particular Identifying Site Conditions.

This module must be delivered with reference to Electrical Safety, and Powerline Clearance Codes relevant to the participant's State or Territory

### Conditions of assessment

Conditions must provide for the demonstration of competence in skills and associated knowledge in all learning outcomes. Assessment conditions must provide for the demonstration of both theoretical and practical skills and knowledge. Practical demonstration must be conducted under direct supervision and in a safe environment. Participants require access to work sites for assessment requirements in Learning Outcome 9.

Oral presentation, written work, practical demonstration drawings/sketches, identification using pictures or in real or simulated work situation

## 7. Learning outcome details

### Learning outcome 1

**Use electrical safety and powerline clearance laws, regulations and codes.**

### Assessment criteria

- 1.1 Using the electrical safety and powerline clearance regulations and codes relevant to the participant's State/Territory, identify the safety responsibilities of the employer and the employee when working around electrical conductors.
- 1.2 Identify any relevant licensing requirements and categories of person permitted to work around electrical conductors relevant to the participant's State/Territory.
- 1.3 Describe the safety requirements regarding personal protective equipment, clothes, jewellery and any other personal items containing metal, for persons working around powerlines.

### Learning outcome 2

**Identify low voltage (240V) aerial open wire systems, and other domestic services.**

**Assessment criteria**

- 2.1 Identify and describe features of 2, 3 and 4 open wire electrical services to homes and factories and 2,3 and 4 core type cables.
- 2.2 Identify and describe the features of telephone and cable services.
- 2.3 Identify and describe the features of: a low voltage strain assembly; a low voltage isolator; a low voltage cross arm termination; a low voltage pole termination.
- 2.4 Identify factors which make working around Low Voltage electrical conductors potentially more hazardous than High Voltage conductors.

**Learning outcome 3**

**Identify the type and configuration of electrical insulators.**

**Assessment criteria**

- 3.1 Identify and describe 11KV, 22KV and 66KV pin-type insulators.
- 3.2 Identify and describe 66 KV and 22KV post type insulators.
- 3.3 Identify and describe the configuration of 6.6KV, 11KV, 22KV and 66KV disc insulators.

**Learning outcome 4**

**Identify single wire earth return (S.W.E.R.) systems and wooden and concrete pole mounted systems.**

**Assessment criteria**

- 4.1 Identify and describe the features of a single wire earth return (S.W.E.R.) system.
- 4.2 Identify and describe the features of a high voltage system mounted above a low voltage system on wooden poles and cross arms.
- 4.3 Identify and describe the features of a high voltage system mounted on wooden poles and cross arms.
- 4.4 Identify and describe the features of a 22KV concrete pole with steel cross arms mounted In a cruciform configuration.
- 4.5 Identify and describe the features of a 66KV system mounted over a 22 KV subsidiary circuit concrete pole.

- 4.6 Identify and describe the features of a multi-circuit construction containing 66kv, 22KV and low voltage systems mounted on a concrete pole.
- 4.7 Identify and describe the features of a 66KV double circuit system mounted on a concrete pole.
- 4.8 Identify and describe the features of High Voltage offset construction.
- 4.9 Identify and describe the features of correctly and incorrectly applied spreaders.
- 4.10 Identify the notification requirements for incorrectly applied spreaders.
- 4.11 Identify and describe the features of an aerial earth cable and a supervisory cable.

**Learning outcome 5**

**Identify transformers.**

**Assessment criteria**

- 5.1 Identify and describe features of transformers mounted between High Voltage and Low Voltage conductors.
- 5.2 Identify and describe features of transformer mounted below Low Voltage conductors.
- 5.3 Identify and describe a S.W.E.R. transformer.
- 5.4 Identify and describe any safe to approach requirements for S.W.E.R transformers.

**Learning outcome 6**

**Identify switches and fuses.**

**Assessment criteria**

- 6.1 Identify and describe the features of a cross arm mounted High Voltage switch.
- 6.2 Identify and describe the features of a vertical or horizontally mounted High Voltage switch pole.
- 6.3 Identify and describe the features of a High Voltage powder filled fuse.
- 6.4 Identify and describe the features of an expulsion drop out fuse.

**Learning outcome 7**

**Identify Aerial Bundled Cable (A.B.C).**

**Assessment criteria**

- 7.1 Identify and describe the features of a Low Voltage Aerial Bundled Cable including catenary wire.
- 7.2 Identify and describe the features of a High Voltage Aerial Bundled Cable including catenary wire.

**Learning outcome 8**

**Identify clearance distances from electrical conductors for persons and tools, elevated work platforms and trees.**

**Assessment criteria**

- 8.1 Using the electrical safety codes pertaining to the participant's State/Territory, identify powerline clearance distances for: persons; trees; elevated work platforms as related to each voltage category listed in the code for powerline clearance operations.
- 8.2 Using the electrical safety codes pertaining to the participant's State/Territory, identify the conditions relating to working above, next to, and below electrical conductors.
- 8.3 Describe the conditions in which the conductor must be de-energised before powerline clearance work can be undertaken.
- 8.4 Define 'swag' and sway' and describe the influence these have on powerline clearance distances.
- 8.5 Describe the effect windy conditions have on the estimation of powerline clearance distances.
- 8.6 Identify margins of safety used in the estimation of powerline clearance distances.
- 8.7 Describe the conditions in which a safety observer is used, and their responsibilities.

**Learning outcome 9**

**Apply voltage identification and powerline clearance distance requirements.**

**Assessment criteria**

- 9.1 In a real or simulated work situation identify the voltage of electrical conductor/s and clearance requirements for all electrical apparatus.
- 9.2 Identify and describe the clearance requirements for the electrical conductor/s with regard to area categories, persons and tools, elevated work platforms, and trees.
- 9.3 Identify whether a safety observer should be used.
- 9.4 Identify trees which are growing or may grow into clearance zones.
- 9.5 Identify tree branches, limbs, roots which may have to be removed and re-growth space requirements.

**8. Delivery of the module**

**Delivery strategy**

Delivery may be through full- or part-time study, on- or off-the-job. Practical components must be delivered in a manner which ensures the safety of participants.

Delivery methods must provide for the demonstration of skills and associated knowledge specified in all learning outcomes either at work sites or simulated work site conditions.

Delivery must take into account current legislation, regulations and codes of practice pertaining to electrical safety and powerline clearance in the participant's State or Territory

**References**

*Code of Practice for Powerline Clearance (Vegetation) 1996 (Vic.)*, Office of the Chief Electrical Inspector

*Code of Practice on Electrical Safety for Work on or Near High Voltage Electrical Apparatus (The Blue Book)*, 1998 (Vic.), Office of the Regulator General.

*Code of Practice – Amenity tree Industry, August 1998, Catalogue no. 34*, WorkCover Authority, New South Wales

*WorkCover Certificate of Exemption 5099*, WorkCover Authority, New South Wales, 1995

*Electrical Safety Code (Tas.)*, Version 1, 1997

*Electrical Industry Safety Code, 1998*, Queensland Department of Mines and Energy.

*Code of Practice for Personnel Electrical Safety for Vegetation Control Near Live Powerlines*, the Director of Energy Safety, Office of Energy West Australia, 1996

*Regulation 316A of the Electricity Act Regulations 1947, Western Australia*

*Electricity (Principles of Vegetation Clearance) Regulations 1996*, South Australia

*Electricity Act 1996* (incorporating amendments as at 5<sup>th</sup> March, 1998), South Australia

*Schedule 6 – Clearance from Powerlines (Regulations 40, 41, 44)*, South Australia (published corrections to the Act)

**Occupational health and safety requirements**

Work practices must comply with current State and Federal Occupational Health and Safety requirements and practiced under the supervision of experienced and qualified personnel