

## 1. Module Details

**Module name** **Live Line Glove & Barrier/Hotstick/Combined to 33kV**

**Nominal duration** **200-220 hours**

### **Five and a half Modules**

The required hours of supervised learning or training deemed necessary to present the material within this module adequately is a minimum of 200-220 hours. This duration includes the time taken to assess the module purpose but does not include necessary workplace experience and practice after initial training and before competence is assessed.

The nominal duration assumes that the learner has the prescribed entry skills and knowledge, being Powerline worker AQF Certificate III or equivalent qualification.

**Module codes** NUE245.1

**Discipline code** 0703130

## 2. Module Purpose

This module will provide the trainee with the theoretical knowledge and practical skills required to practice live line glove and barrier/hotstick techniques on energised high voltage **conductors up to 33kV**.

## 3. Prerequisites

That the learner has the prescribed entry skills and knowledge, being Powerline worker AQF Certificate III or equivalent qualification, and successfully completed:

NUE224 High Voltage Principles

*and*

NUE223 Low Voltage - Energised Working Practice

*or*

NUE214 Transmission Systems: Installation and Maintenance A

#### 4. Relationship to Competency Standards

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the ESI National Transmission and Distribution Training Package and related unit NTD 404 B Maintain Energised High Voltage Overhead Electrical Apparatus.

#### 5. Content

##### **Hotstick methods, policy and general procedures**

- Hotstick methods principles
- definitions
- structures
- personnel and training
- equipment
- general work practices
- hotstick techniques

##### **Glove and barrier method, policy and general procedures**

- Glove and barrier method
- principles
- definitions
- structures
- personnel and training
- equipment
- general work practices
- glove and barrier techniques

##### **Hotstick techniques**

- Install and/or replace high voltage insulators
- Erect and/or replace high voltage crossarms
- Connect and/or disconnect high voltage bridges/connections
- Install and/or maintain electrical equipment
- Erect and/or replace poles
- Repair and/or high voltage armour rods and/or line guards, and/or convert intermediate construction to strain construction

##### **Glove & Barrier techniques**

- Install and/or replace high voltage insulators

- Erect and/or replace high voltage crossarms
- Connect and/or disconnect high voltage bridges/connections
- Install and/or maintain switching devices
- Erect and/or replace poles
- Repair and/or replace high voltage conductors/cables
- Convert intermediate construction to strain construction.

### **Supporting conductors**

- Methods of support
- Equipment
- Conductor loads
- Wind loads
- Resultant forces
- Rigging and application support equipment
- Rigging and application strain equipment

## **6. Assessment strategy**

### **Assessment method**

Short answer questions (written, oral or graphic or computer based). These include:

- Multiple choice questions
- Oral questions
- Observations
- Assignments
- Other recognised methods

Suitable practical exercises, which assess the skills and knowledge, required of each learning outcome in an holistic manner.

### **Conditions of assessment**

Learning and assessment will take place in an environment that is conducive to a learner's development.

## **7. Learning Outcome Details**

### **Learning outcome 1**

**Explain the policy, safety instructions, risk assessment processes that apply and general work practices and procedures for high voltage live line hotstick techniques.**

**Assessment Criteria**

- 1.1 Interpret the relevant definitions related to live line high voltage hotstick work.
- 1.2 Identify the structures from which hotstick methods can be performed.
- 1.3 Identify the limits of approach observed by personnel approaching exposed live high voltage conductors.
- 1.4 Define the responsibilities of personnel associated with the practice hotstick methods.
- 1.5 Describe the criteria for selection, and training requirements of personnel who are to be trained in live line high voltage hotstick techniques.
- 1.6 Identify the items of equipment used for hotstick work, and their compliance with relevant standards.
- 1.7 Determine responsibilities for, and how to care for and maintain all insulating live line hotstick equipment.
- 1.8 Identify the general work practices and procedures associated with live line high voltage hotstick techniques
- 1.9 Identify the range of functions/work that can be performed utilising hotstick techniques.
- 1.10 Outline the risk assessment process and requirements that should be followed when performing hotstick techniques using requisite enterprise procedures consistent with ESAA Guidelines.

**Learning outcome 2**

**Explain safe work practices, techniques and procedures for plant, equipment and tools used and load factors associated with high voltage live line hotstick work on voltages up to an including 33kV.**

**Assessment Criteria**

- 2.1 Identify the types of plant, equipment and tools used for high voltage live line hotstick work and explain their application.

- 2.2 Explain the construction, characteristics, limitations and safe working load of plant, equipment and tools used for high voltage live line hotstick work.
- 2.3 Explain inspection, testing, maintenance and storage requirements and procedures for plant, equipment and tools used for high voltage live line hotstick work.
- 2.4 Explain the use of switching permits in relationship to HV Live Line work
- 2.5 Identify the different conductor support methods and the equipment used to support conductors.
- 2.6 Explain the construction, characteristics and limitations of conductor support equipment.
- 2.7 Identify the methods used to calculate conductor loads and wind loads on conductors.
- 2.8 Explain the construction, characteristics and limitations of conductor support equipment.
- 2.9 Identify the methods used to calculate conductor loads and wind loading on conductors.
- 2.10 Describe the effects of resultant forces when transferring conductor loads.
- 2.11 Explain rigging procedures for conductor support equipment.
- 2.12 Inspect, test and maintain plant, equipment and tools used for high voltage live line hotstick work.
- 2.13 Calculate conductor loads and wind loading on conductors.
- 2.14 Select the appropriate conductor support method in accordance with job requirements.
- 2.15 Rig conductor support equipment in accordance with enterprise/job requirements and manufacturers specifications.

### Learning outcome 3

**Describe high voltage live line glove and barrier techniques used in live line work.**

- 3.1. Interpret the relevant definitions related to live line high voltage glove and barrier.
- 3.2. Identify the structures from which glove and barrier methods can be performed.
- 3.3. Identify the conditions under which combination glove and barrier and stick methods can be practiced.
- 3.4. Define the responsibilities of personnel associated with the practice of glove and barrier work.
- 3.5. Determine the selection criteria and training requirements of personnel who are to be trained in live line high voltage rubber gloving techniques
- 3.6. Identify the items of equipment used for glove and barrier work and their compliance with relevant standards.
- 3.7. Determine responsibilities and maintain requirements for live line glove and barrier equipment.
- 3.8. Identify the general work practices and procedures associated with live line high voltage glove and barrier techniques.
- 3.9. Identify the task that can be that can be performed utilising glove and barrier techniques.

#### **Learning outcome 4**

#### **Install and/or replace high voltage insulators using live line hotstick and glove and barrier techniques.**

#### **Assessment Criteria**

- 4.1 Identify the equipment required to install and/or replace high voltage insulators.
- 4.2 Identify the methods required to install and/or replace high voltage insulators.
- 4.3 Install and/or replace high voltage insulators, which shall include at least 3 of these items below:
  - Intermediate insulators/suspension insulators
  - Angle insulators
  - Bridging insulators
  - Strain insulators

**Learning outcome 5****Erect and/or replace high voltage crossarms using live line hotstick and glove and barrier techniques.****Assessment Criteria**

- 5.1 Identify the equipment required to erect and or replace high voltage crossarms.
- 5.2 Identify the methods required to erect and/or replace a high voltage crossarm.
- 5.3 Replace across a representative range high voltage crossarms, utilising hotstick techniques which shall include both:
  - Intermediate, and
  - Angle.
- 5.4 Replace across a representative range high voltage crossarms, utilising glove and barrier techniques, which shall include at least 3 of these items below:
  - Intermediate/suspension
  - Angle
  - Strain
  - Termination

**Learning outcome 6****Connect and/or disconnect high voltage bridges/connections using live line hotstick and glove and barrier techniques.****Assessment Criteria**

- 6.1 Identify the equipment required to connect and/or disconnect high voltage bridges/connections.
- 6.2 Identify the methods required to connect and/or disconnect high voltage bridges/connections, including effects of similar/dissimilar metals.
- 6.3 Connect and/or disconnect high voltage bridges/connections while maintaining supply, which shall include at least 3 of these items below:
  - Strain/“Tee” Bridges
  - Bypass bridges/connections
  - High Voltage A.B.C.
  - High voltage Underground
- 6.4 Energise and/or de-energise a section of conductor/cable, which shall include:
  - Strain/“Tee” Bridges and
  - Bypasses and
  
  - High Voltage A.B.C. or
  - High voltage Underground

**Learning outcome 7****Install and/or maintain electrical equipment and line hardware using live line hotstick and glove and barrier techniques.****Assessment Criteria**

- 7.1 Identify the equipment required to install and/or maintain electrical equipment and line hardware.
- 7.2 Identify the methods required to install and/or maintain electrical equipment and line hardware.
- 7.3 Install and/or maintain electrical equipment and line hardware, which shall include:
  - Air break switches, and
  - Fuse assemblies or Isolators, and any three of the following:
    - Dampers
    - Spreaders
    - Bird diverters
    - Gas switches
    - Bird covers
    - Surge diverters
    - Fault indicators

**Learning outcome 8****Erect and/or replace poles using live line hotstick and glove and barrier techniques.****Assessment Criteria**

- 8.1 Identify the equipment required to erect and/or replace poles.
- 8.2 Identify the methods required to erect and/or replace poles.
- 8.3 Erect and/or replace poles, which shall include at least 2 of these items below:
  - Intermediate/Suspension
  - Angle
  - Strain
  - Termination

**Learning outcome 9****Repair and/or replace high voltage conductors/cables using live line glove and barrier techniques.****Assessment Criteria**

- 9.1 Identify the equipment required to repair and/or replace high voltage conductors/cables.

- 9.2 Identify the method required to repair and/or replace high voltage conductors/cables.
- 9.3 Repair and/or replace section(s) of high voltage conductors/cables.
- 9.4 Install and/or replace armour rods and line guards
- 9.5 Convert strain construction to intermediate construction.

### **Learning outcome 10**

**Repair and/or replace high voltage armour rods and/or line guards using live line hotstick techniques.**

### **Assessment Criteria**

- 10.1 Identify the equipment required to repair and/or replace high voltage armour rods and/or line guards.
- 10.2 Identify the methods required to repair and/or replace high voltage armour rods and/or line guards.
- 10.3 Repair and/or replace high voltage armour rods and/or line guards.

### **Learning outcome 11**

**Convert intermediate structure to strain arrangements using live line hotstick and glove and barrier techniques.**

### **Assessment Criteria**

- 11.1 Identify the equipment required to convert intermediate structures to strain arrangements.
- 11.2 Identify the methods required to convert intermediate structure to strain arrangements.
- 11.3 Convert intermediate structures to strain arrangements.

## **8. Delivery of the module**

### **Delivery strategy**

#### **(i) General**

Delivery strategies must be suitable for both theoretical and/or practical learning and module purpose.

It is recommended, that should the class size be less than three (3) students/learners, then additional qualified assistance would be required in order to conduct the training in a safe manner.

It is recommended, that no maximum class size

be established, however, should the number of students/learners exceed five (5) and, in order for each student/learner to achieve the required competencies, a commensurate extension of the course duration will be required.

It is recommended that learning and assessment be facilitated in a wholistic manner, which may require a learning sequence other than indicated in the body of this module descriptor.

**(ii) Specific requirements for combined hotstick/glove and barrier**

Combined hotstick/glove and barrier training should cover the following representative range of activities for each given live-line technique:

**Hotstick method across a range is to include:**

- Replace an intermediate straight line crossarm (pin and suspension) utilising lever lift or lifting stick equipment
- Pole top inspections
- Release and support high voltage conductors

**Glove and barrier method across a range is to include:**

- Replace a Strain Crossarm
- Replace an intermediate straight line crossarm (pin and suspension) utilising gloving auxiliary crossarm/pole mounted conductor supports, etc.
- Replace lightning arrestor
- Convert an intermediate to a strain construction
- Convert a strain to intermediate construction
- Convert/upgrade intermediate constructions, where there is a requirement to relocate/move conductors
- Replace non-tension connections
- Replace full tension connections
- Release and support high voltage conductors

**Combined insulated Stick/Glove and barrier methods across a range is to include:**

- Replace an angle crossarm
- Install and maintain an Air Break Switch
- Replace a fuse unit or link
- Energise/de-energise open wire

- Energise/de-energise underground conductors
- Erect pole mid-span
- Replace a condemned pole
- Replace a strain pole
- Release and support high voltage conductors

### Resource requirements

- Relevant Australian Standards
- Enterprise Hotstick” work manuals and standing instructions, diagrams and layouts
- ESAA Guidelines for “High Voltage Live Line Hotstick Work”
- Electrical Safety Instructions
- Code of Practice for Testing Insulated Hotsticks
- Relevant manufacturers’ equipment manuals.

Resources sufficient for the students to carry out learning activities on an individual basis.

Including:

- Facilities
- Comfortable training room
- Training area with suitable structures and electrical apparatus
- Materials and equipment
- Suitable plant and equipment
- Specialised high voltage live line tools and equipment
- Testing and measuring equipment
- High voltage conductor hardware and equipment
- Range of hotsticks and attachments

### Occupational health and safety requirements

Students 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.