

1. Module details**Module name****Extra High Voltage: Bare-hand Live Line Principles****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 36 - 40 hours.

Module code

NUE225

Discipline code

0703130

2. Module purpose

This module is to provide knowledge and practical skills that underpin safe practice and effective working practice in the application of bare-hand live line operations at voltages of 132 kV and above. The module prepares trainees for practical maintenance work on transmission tower hardware under live line (bare-hand) conditions.

3. Prerequisites

NUE224 High Voltage Principles.

4. Relationship to competency standards

This module partially addresses Unit 4.4 of the E.S.I. National Competency Standards for Overhead Linework and Cable Jointing.

5. Content**Ropes**

insulating rope
live line rope
rescue rope
rope storage
insulation integrity
splicing

Bare hand live line tools

live line insulator tester
live line insulating rope test set
ladder leakage monitor

Preparation for bonding on

assigning of tasks
preparation of
ropes
hotsticks
workers

Connecting and rigging

rope tackles
ladder position
ladder leakage current

positioning

Bonding on procedures

communication with safety observer
 worker positioning
 connection of bonding wand

Bonding off procedures

positioning and alighting

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.

7. Learning outcome details

Learning outcome 1

Describe and identify the types, correct storage for and insulation integrity of the insulating ropes used for bare-hand live.

Assessment criteria

- 1.1 Describe insulating rope.
- 1.2 Describe live line rope.
- 1.3 Describe rescue rope.
- 1.4 Identify the uses and restrictions for insulating rope.
- 1.5 Identify the uses and restrictions for live line rope.
- 1.6 Identify the uses and restrictions for rescue rope.
- 1.7 List the "Do's and Don'ts of storing ropes for bare-hand live linework and describe storage facilities necessary for ropes for bare-hand live linework.
- 1.8 Describe how to clean and care for ropes for bare-hand live linework.
- 1.9 Label ropes for bare-hand live linework.

Learning outcome 2

Assessment criteria

- 1.10 Conduct Low Voltage tests on ropes for bare-hand live linework.
 - 1.11 Describe the High Voltage tests conducted on ropes for bare-hand live linework.
 - 1.12 Detail the frequency of tests carried out on ropes for bare-hand live linework.
 - 1.13 Splice insulating rope.
 - 1.14 Prepare an eye in insulating rope.
 - 1.15 Prepare the ends of insulating rope.
- Describe and demonstrate the use of the tools used in the use of the tools used in bare-hand live linework.**
- 2.1 Describe the test measuring principle of the live line insulator tester.
 - 2.2 Prepare the live line insulator tester for use.
 - 2.3 Measure the voltage distribution across a string of disc insulators using the live line insulator tester.
 - 2.4 Describe the test measuring principle of the live line insulating rope test set.
 - 2.5 Prepare the live line insulating rope test set for use.
 - 2.6 Measure the suitability of insulating and live linework using the live line insulating rope test set.
 - 2.7 Describe the test measuring principle of the ladder leakage monitor.
 - 2.8 Prepare the Ladder Leakage monitor for use on the live line ladder.
 - 2.9 Prepare the live line ladder for bare-hand live linework.
 - 2.10 Monitor the leakage current along the live line ladder and determine it's continued suitability for bare-hand live linework.

Learning outcome 3	Prepare tools and equipment for a bare-hand work method.
Assessment criteria	<ul style="list-style-type: none">3.1 Assign tasks to each team member.3.2 Prepare ropes for use.3.3 Prepare hotsticks for use.3.4 Prepare bare-hand worker for livework conditions.3.5 Determine the minimum number of sound discs on the intended work string.
Learning outcome 4	Connect and rig equipment necessary to carry out method 330/8.
Assessment criteria	<ul style="list-style-type: none">4.1 Use rope tackles to raise live line ladder into work position.4.2 Position ladder in contact with conductor.4.3 Monitor ladder leakage current.4.4 Position live line ladder appropriately for bare-hand worker.
Learning outcome 5	Bond on to a transmission line conductor.
Assessment criteria	<ul style="list-style-type: none">5.1 Use appropriate means to communicate effectively with the nominated Safety Observer at all times.5.2 Move out onto the live line ladder with safety.5.3 Move out toward the transmission line conductor along the live line ladder with safety.5.4 Connect the bare-hand conductive suit bonding wand to the transmission line conductor.
Learning outcome 6	Bond off from a transmission line conductor.
Assessment criteria	<ul style="list-style-type: none">6.1 Disconnect the bare-hand conductive suit bonding wand from the transmission line conductor.6.2 Move back along the live line ladder toward the transmission line tower with safety.6.3 Alight from the live line ladder onto the Transmission line tower with safety.

8. Delivery of the module

Delivery strategy

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

Resource requirements

As well as classroom based facilities this module requires the following equipment.

Insulating ropes

Live line ropes

Rescue kit

Storage containers with moisture depleting agent

Insulating rope tester

AB Chance silicon cloths for insulating rope

Separate high voltage source up to 300 kV

Live line hotstick kit

Live line insulator tester

Ladder leakage monitor

Insulating rope test set

Insulating rope, live line rope

Disc Insulator String

Mock Transmission tower wing.

Enterprise construction manuals

Relevant Australian standards

Enterprise work manuals and standing instructions

Relevant manufacturers' equipment manuals

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. Trainees will at all times adhere to the Occupational Health and Safety code and wear suitable protective clothing when in a field situation. Electrical safety must be emphasised.