

**1. Module details****Module name****Transmission Systems: Installation and Maintenance - A****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 54 - 60 hours.

**Module code**

NUE214

**Discipline code**

0703130

**2. Module purpose**

This module is designed to supply the knowledge and skills required by electricity supply industry workers to install and maintain transmission systems.

The experience gained is in the correct procedures and practices involved in preparing for and carrying out installation and maintenance of transmission system insulators and conductors.

Identification of voltage level, insulator type and arrangement, conductors, and structures. Gain access to de-energised transmission lines, rigging methods, changing insulators, installing temporary work platforms, installing conductor protection hardware and washing de-energised line insulators. All procedures and practices comply in accordance with electricity Supply Industry Standards, Supply Authority regulations, relevant Australian Standards, enterprise requirements and OH&S regulations.

**3. Prerequisites**

NE160 Electrical Principles 1.

NUE207 Powerline Safety Practices.

NE175 Workshop practices.

NUE236 Rigging (Basic).

**4. Relationship to competency standards**

This module addresses Unit 2.9, 3.2 and 3.5 of the E.S.I. National Competency Standards for Overhead Line Work and Cable Jointing.

**5. Content****Transmission structures and hardware**

voltages

structures (insulators, conductors, enterprise technical

drawings, vibration dampers, torsional, stockbridge, spacers)

aircraft warning devices

**Climbing**

poles

towers

**Square rigging principles**

advantages, disadvantages  
rigging forces  
reference to enterprise drawings (conductor weight per span calculations (level and uneven terrain/structures)  
field calculations of a line deviation  
angle  
vector diagrams  
square - rigging practical

**Transmission equipment**

tools  
cables  
winches  
ropes  
slings  
hoists

**Work platforms**

rigging work platforms  
hook ladders  
temporary work platforms  
gondolas

**Suspension insulator change**

conductor forces calculations  
equipment required  
procedure  
safety precautions

**Horizontal/vertical post insulator change**

conductor forces calculations  
equipment required  
procedure  
safety precautions

**Strain insulator change**

methods  
equipment required  
safety precautions

**Dead line insulator washing**

methods  
equipment  
safety precautions

## 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

**Identify the different voltages, insulators, conductors and structures and the maintenance procedures related to them.**

### Assessment criteria

- 1.1 Identify various transmission voltages used within the electrical supply industry.
- 1.2 List and identify the various insulators used within the transmission system.
- 1.3 List and name the common conductors used within the transmission system.
- 1.4 Name the transmission structures used within the transmission system.
- 1.5 List the reasons for Routine Maintenance procedures to be adopted.
- 1.6 Explain the steps taken to follow routine maintenance Inspection / Patrols as detailed by the Transmission / Supply Authority.

### Learning outcome 2

**Gain access to de-energised overhead transmission systems.**

### Assessment criteria

- 2.1 Identify requirements and limitations for testing, earthing and gaining access to a de-energised overhead transmission system.
- 2.2 Test transmission conductors de-energised and apply earthing device.
- 2.3 Receive permission to work on overhead transmission conductors.

<b>Learning outcome 3</b>	<b>Demonstrate the practical and theoretical knowledge of square rigging methods and forces applicable to transmission line work.</b>
<b>Assessment criteria</b>	<p>3.1 List the requirements of a square rigging system.</p> <p>3.2 Calculate the forces at work within a given square rigging system.</p> <p>3.3 Construct a square rigging system to erect and remove transmission equipment and hardware from a tower.</p>
<b>Learning outcome 4</b>	<b>Demonstrate the procedure to change insulators on transmission structures which may include vertical angle, suspension, strain insulator, post insulator (horizontal or vertical), bridge insulator.</b>
<b>Assessment criteria</b>	<p>4.1 Identify and interpret technical drawings associated with transmission structures used on them.</p> <p>4.2 Calculate conductor forces involved for a given exercises.</p> <p>4.3 Select and prepare equipment required to change insulators on transmission structures.</p> <p>4.4 Replace insulators on transmission structures which may include:          - vertical angle          - suspension          - strain insulator          - post insulator - horizontal or vertical          - bridge insulator.</p>
<b>Learning outcome 5</b>	<b>Install temporary work platforms onto transmission structures.</b>
<b>Assessment criteria</b>	<p>5.1 Identify and interpret technical drawings associated with transmission structures and the use of temporary work platforms used on them.</p> <p>5.2 Identify work methods used to install temporary work platforms onto transmission structures.</p> <p>5.3 Identify tools and equipment required to install temporary work platforms onto transmission structures.</p> <p>5.4 Install temporary work platforms onto transmission structures.</p>

<b>Learning outcome 6</b>	<b>Install conductor protection hardware and list the benefits of using them.</b>
<b>Assessment criteria</b>	<p>6.1 Identify and interpret technical drawings associated with transmission structures and the use of conductor protection hardware.</p> <p>6.2 List common dampers used in transmission constructions.</p> <p>6.3 Describe the theory of “Aeolian Vibration” and how it is controlled.</p> <p>6.4 Select appropriate dampers, tools and equipment, and install dampers onto conductors.</p>
<b>Learning outcome 7</b>	<b>Demonstrate the procedure for Dead Line Insulator Washing.</b>
<b>Assessment criteria</b>	<p>7.1 List the Supply Authority regulations for, and demonstrate washing de-energised transmission lines.</p> <p>7.2 Identify methods of washing de-energised transmission lines.</p> <p>7.3 Wash de-energised transmission lines.</p>
<b>8. Delivery of the module</b>	
<b>Delivery strategy</b>	<p>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.</p>
<b>Resource requirements</b>	<p>Enterprise construction manuals            Relevant Australian Standards            Enterprise work manuals and standing instructions            Relevant manufacturers’ equipment manuals            Suitable site location - poles/towers            Samples of hardware for repair/replacement            Range tools and transmission equipment            Safety equipment            Appropriate mechanical plant</p>
<b>Occupational health and safety requirements</b>	<p>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.</p>