

**Domain****ELECTRICAL INSTALLATION****Title:****Demonstrate knowledge of advanced electrical engineering principles****Level: 4****Credits: 6****Purpose**

This unit standard is intended for those who demonstrate knowledge of advanced electrical engineering principles. People credited with this unit standards are able to demonstrate knowledge of Kirchhoff's laws; demonstrate knowledge of circuit theorems; demonstrate knowledge of three phase circuits; and demonstrate knowledge of transformer principles.

This unit standard is intended for those who work as electricians.

**Special Notes**

1. Entry information:

Prerequisite

- *none*

2. This unit standard is to be delivered and assessed in the context of electrical operations and should be assessed in conjunction with other relevant technical units selected from this domain.
3. To demonstrate competence, at a minimum, evidence is required from correct explanations of circuit laws and theorems as well as performing calculations applying these laws.
4. Assessment evidence may be collected from a real workplace or a simulated workplace environment in which electrical operations are carried out.

**Quality Assurance Requirements**

This unit standard and others within this subfield may be awarded by institutions which meet the accreditation requirements set by the Namibia Qualifications Authority and the Namibia Training Authority and which comply with the national assessment and moderation requirements. Details of specific accreditation requirements and the national assessment arrangements are available from the Namibia Qualifications Authority on [www.namqa.org](http://www.namqa.org) and the Namibia Training Authority on [www.nta.com.na](http://www.nta.com.na).

## **Elements and Performance Criteria**

### **Element 1: Demonstrate knowledge of Kirchhoff's laws**

#### **Performance Criteria**

- 1.1 Kirchhoff's laws are stated and explained.
- 1.2 Kirchhoff's laws are applied in performing calculations in electrical circuits.

### **Element 2: Demonstrate knowledge of circuit theorems**

#### **Performance Criteria**

- 2.1 Thevenin's theorem is stated and explained.
- 2.2 Thevenin's theorem is applied in performing calculations of electrical circuits.
- 2.3 Norton's theorem is stated and explained.
- 2.4 Norton's theorem is applied in performing calculations in electrical circuits.

### **Element 3: Demonstrate knowledge of three phase circuits**

#### **Performance Criteria**

- 3.1 Three phase alternating current generation is explained.
- 3.2 Delta and Star connections are explained and applied in electrical circuits.
- 3.3 Calculations are performed for balanced and unbalanced three phase loads.

### **Element 4: Demonstrate knowledge of transformer principles**

#### **Performance Criteria**

- 3.1 Principles of operation of a transformer are explained.
- 3.2 Causes of transformer losses are identified and methods for reducing them are explained.
- 3.3 Transformer full load and no-load tests are explained.
- 3.4 Transformer regulation is explained and practical applications are given.
- 3.5 Calculations for transformer with varying loads are performed.

## **Registration Data**

<b>Subfield:</b>	Electrical Engineering
<b>Date first registered:</b>	24 July 2014
<b>Date this version registered:</b>	23 November 2023
<b>Anticipated review:</b>	23 November 2028
<b>Body responsible for review:</b>	Namibia Training Authority