Unit ID: E020

Domain **ELECTRONICS**

Title: **Demonstrate and apply knowledge of power electronics**

Level: 3 **Credits: 8**

Purpose

This unit standard specifies the competencies required to demonstrate and apply knowledge of power electronics. It includes identifying power electronic components, analysing power electronic circuits, sketching power electronic schematic diagrams and simulating power electronic circuits. This unit standard is intended for those who work in electronics industry.

Special Notes

1. Entry information

   Prerequisite
   - *Unit E01 - Apply health and safety rules and regulations in electronics workplace*
   - *Unit E02 - Plan and organise work in electronic work environment*

2. Assessment evidence may be collected from a real or a simulated workplace in which electronics operations are carried out.

3. To demonstrate competence, minimum evidence of ability to: identify power electronic components, analyse power electronic circuits, sketch power electronic schematic diagrams and simulate power electronic circuits (at least 50 percent of all areas in each element) is required

4. All circuit analyses methods include calculations, measurements and simulations

5. Parameters to be calculated includes impedance, current, voltage and power dissipated.

6. Glossary of terms:
   - *'OHS'* refers to Occupational Health and Safety
   - SCR – Silicon Controlled Rectifier
   - TRIAC – Triode AC Switch
   - DIAC – Diode AC Switch
   - AC – Alternating Current
   - DC – Direct Current
   - IEC 60617-This standard is issued by the **International Electro-technical Commission** and this standard for electrical components symbols.
   - IEEE- Institute of Electrical and Electronics Engineers.

7. Performance of all elements in this unit standard must comply with industry standards.

8. Regulations and legislation relevant to this unit standard include the following:
   - Labour Act, No. 11, 2007.
   - Electricity Act, No. 4, 2007

- Occupational Health and Safety Regulations No. 18, 1997 and all subsequent amendments.

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 and the Namibia Training Authority on www.nta.com.na.

Elements and Performance Criteria

Element 1: Identify power electronic components

Range
Power electronics components include but not limited to diodes, Schottky diodes, thyristors, SCR, power transistors, TRIAC, DIAC.

Performance Criteria

1.1 Power electronic components in a circuit are identified by their symbols, inspection and/or data sheet.

1.2 Power electronic components pin layouts are determined from data sheet and/or by inspection.

Element 2: Analyse power electronic circuits

Range

Power electronics circuits to be analysed include but not limited to rectifier diodes circuits, Schottky diodes circuits, SCR circuits, power transistors circuits, TRIAC circuits, DIAC circuits, SNUBBER circuits, AC to DC converters, DC to DC converters, DC to AC inverters, AC to AC converters.

Performance Criteria

2.1 Types of power electronic circuits are determined by inspection.

2.2 Measurements and/or calculations are performed to determine the functionality of power electronic circuits using appropriate instruments.

2.3 Measurement and/or calculated results are recorded and interpreted.

Element 3: Sketch power electronic schematic diagrams

Range
Power electronics circuits to be analysed include but not limited to AC to DC converters, DC to DC converters, DC to AC inverters, AC to AC converters and SNUBBER circuits.

Performance Criteria

3.1 Power electronic component symbols used in schematic diagrams are in accordance with the IEC/IEEE standards.

3.2 Components in schematic diagrams are connected in accordance with the IEC/IEEE standards to represent a given physical circuit.

3.3 Components in schematic diagrams are labelled with values in accordance with the IEC/IEEE standard.

3.4 Circuit diagrams are captioned according to workplace standards.

Element 4: Simulate power electronic circuits

Range

Power electronics circuits to be simulated include but not limited to AC to DC converters, DC to DC converters, DC to AC inverters, AC to AC converters and SNUBBER circuits.

Performance Criteria

4.1 Power electronic circuits are captured in electronic simulation software.

4.2 Appropriate virtual instruments are used for measuring circuit parameters.

4.3 Simulation results are recorded with appropriate SI units and interpreted.

4.4 Additional calculations are performed based on the recorded results when required.

Registration Data

Subfield:	Electrical Engineering
Date first registered:	
Date this version registered:	
Anticipated review:	
Body responsible for review:	Namibia Training Authority