Unit ID: 887

Domain **ELECTRICAL INSTRUMENTATION AND CONTROL**
Title: **Perform basic industrial instrument installations, measurements and calibration**

Level: 4 **Credits: 4**

Purpose

This unit standard is intendent for those who perform industrial instrument installation, measurement and calibration. People credited with this unit standard are able to apply knowledge of industrial instrumentation installation; apply knowledge of temperature measurement and calibration; apply knowledge of pressure measurement and calibration; apply knowledge of level measurement and calibration; and apply knowledge of flow measurement and calibration.

Special Notes

1. Entry information:

   Prerequisite
   - *Unit 1157 - Demonstrate basic knowledge of workplace health and safety*

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

3. This unit standard covers but is not limited to installation, measurement and calibration related to four basic industrial instrument quantities: level, pressure, temperature and flow. Excluded for assessment at this level are installation, measurement and calibration of vibration, position, velocity, weight, density, pH (pH is a logarithmic measurement of the number of moles of hydrogen ions (H+) per litre of solution., gas, radio-active and luminescence.

4. Regulations and legislation relevant to this unit standard include the following: Labour Act, No. 11, 2007.
   - Regulations relating to the health & safety of employees at work under Schedule 1 (2) of the Labour Act No.11 of 2007 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. All approved unit standards, qualifications and national assessment arrangements are available on the Namibia Training Authority website www.nta.com.na.

Elements and Performance Criteria

Element 1: Apply knowledge of industrial instrumentation installation

Range

Installation requirements for measuring elements, sensors and associated transmitters to cover temperature (resistance temperature detection (RTD) and thermocouples), pressure and differential pressure, level (ultrasonic, radar, microwave, laser, inductive and capacitance) and flow (magnetic, orifice, temperature, carioles, positive displacement).

Performance Criteria

1.1 Instrument tubing, pipe work, and fittings are described.

1.2 Requirements for instrument loop cabling and panel wiring are specified.

1.3 Requirements for screening, earthing and lightning protection of instrument devices are described.

1.4 Installation requirements for measuring elements, sensors and associated transmitters are specified.

1.5 Instrument is wired in accordance with details specified in drawings.

1.6 Instrument is tested for specified power and operation requirements.

Element 2: Apply knowledge of temperature measurement and calibration

Performance Criteria

2.1 Knowledge of temperature measurement theory is demonstrated with regard to operational principles of equipment, scale and units used and conversion of units.

2.2 Temperature measurement devices and gauges are described in terms of their operation, characteristics and calibrations.

2.3 Calibration equipment used for temperature transmitters, elements and indicators are described.

2.4 Temperature measurements are performed and readings are taken.

2.5 Transmitters and gauges are calibrated according to specifications.

Element 3: Apply knowledge of pressure measurement and calibration

Performance Criteria

Range

Calibration equipment may include but are not limited manometers, air test equipment, hydraulic test equipment, dedicated electronic precision pressure calibration equipment, vacuum test equipment and nitrogen bottle test equipment.

3.1 Knowledge of pressure measurement theory is demonstrated in terms of operational principles, scales and units used and conversion of units.

3.2 Pressure measurement devices and gauges are described in terms of operating principles and materials of construction for components.

3.3 Signal transmission used in pneumatic and electronic instruments and main components used in their pressure transmitters are described.

3.4 Methods of pressure instrument installation are described with respect to mounting methods, wiring and earthing requirements and isolation seals used.

3.5 Pressure calibration equipment is described.

3.6 Pressure transmitters and gauges are calibrated by adjustments appropriate to the equipment.

Element 4: Apply knowledge of level measurement and calibration

Performance Criteria

4.1 Level measurement theory is explained in terms of operating principles of measurement and gauges and effects of liquid pressure head.

4.2 Calibration methods and procedures for a level measurement system calibration are described.

4.3 Relevant calculation and measurements are performed and level units used are converted by calculation and tables.

4.4 Level measurement devices are calibrated by adjustments appropriate to the equipment.

Element 5: Apply knowledge of flow measurement and calibration

Performance Criteria

5.1 Operating principles of flow measurement and gauges are explained with the assistance of sketches.

5.2 Flow measurement devices and gauges are described in terms of operating principles and features.

5.3 Methods of flow meter installation are described with regard to plate formats and applications and wiring and earthing requirements.

5.4 Laws and equations relating to flow measurement are used to perform flow measurement and calculations.

5.5 Flow meter calibration check procedures are applied.

5.6 Flow meter and associated equipment characteristic graphs are plotted.

Registration Data

Subfield:	Electrical Engineering
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