

**Domain****INSTRUMENTATION AND CONTROL****Title:****Demonstrate basic knowledge of hydraulics  
and pneumatics****Level: 2****Credits: 2****Purpose**

This unit standard specifies the competencies required to demonstrate knowledge of hydraulics and pneumatics. It includes demonstrating knowledge of hydraulic and pneumatic servicing equipment and circuit symbols, control actuators, valves and positioners. This unit standard is intended for those who work in instrumentation industry and related environment.

**Special Notes**

1. Entry information:

Prerequisite

- None

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

3. Performance of all elements in this unit standard must comply with manufacturers' specifications and workplace specific requirements.

4. Glossary of terms:

- 'SANS' refers to South Africa National Standards
- 'IEC' refers to International Electrotechnical Commission
- 'SANS' refers to South Africa National Standards
- 'ISO' stands for International Standards Organization
- 'CETOP' stands for European Oil Hydraulic and Pneumatic Committee

5. Regulations and legislation relevant to this unit standard include the following:

- Labour Act, No. 11, 2007.
- Occupational Health and Safety Regulations No. 18, 1997 and all subsequent amendments.
- SANS 10142-1.

**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](http://www.nta.com.na).

## **Elements and Performance Criteria**

### **Element 1: Demonstrate knowledge of hydraulic servicing equipment and circuit symbols.**

#### **Range**

Symbols may include but are not limited to symbols for cylinders, control valves, exhaust, supply and pilot signals.

#### **Performance Criteria**

- 1.1 Oil filters, their specifications, and their applications are described.
- 1.2 Diaphragm types, oil pressure relief valves, and their applications are described.
- 1.3 Accumulators and their applications are described.
- 1.4 Hazards associated with the use of hydraulic equipment are explained in terms of pressure, fire risk and toxicity.
- 1.5 Oil purity is identified in terms of water content, particulate count and air content.
- 1.6 ISO symbols (also known as CETOP symbols) related to hydraulic are described.
- 1.7 Symbols are applied to circuit diagrams for hydraulic equipment.

### **Element 2: Demonstrate knowledge of pneumatic servicing equipment and circuit symbols.**

#### **Range**

Symbols may include but are not limited to symbols for air cylinders, control valves, exhaust, supply, pilot signals.

#### **Performance Criteria**

- 2.1 Air filters and driers, their specifications, and their applications are described.
- 2.2 Air pressure regulators, pressure boosters and their applications are described.
- 2.3 Air lubricators and their applications are described.
- 2.4 Hazards of pneumatic equipment are explained in terms of pressure and oil content.
- 2.5 ISO symbols related to pneumatic are described.
- 2.6 Symbols are applied to circuit diagrams for pneumatic equipment.

### **Element 3: Demonstrate knowledge of control actuators, valves and positioners.**

#### **Performance Criteria**

- 3.1 Pneumatic and hydraulic cylinder types, features and their applications are described.
- 3.2 Pneumatic and hydraulic motors and their applications are described.
- 3.3 Rotary vane and air bag actuators and their applications are described.
- 3.4 Terms associated with control valve components are defined and control valve characteristics are described.
- 3.5 The concept of control valve sizing for liquid flow is described and relevant calculations are carried out.
- 3.6 Pneumatic and hydraulic valve types and their applications are described.
- 3.7 Interconnections of control valve to actuators are correctly identified.
- 3.8 Electrical control valve actuations are described.
- 3.9 Electro-pneumatic solenoid control valve actuation is described.
- 3.10 Types and applications of valve positioners are described.

#### **Registration Data**

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|--------------------------------------|----------------------------|
| <b>Subfield:</b>                     | Electrical Engineering     |
| <b>Date first registered:</b>        |                            |
| <b>Date this version registered:</b> |                            |
| <b>Anticipated review:</b>           |                            |
| <b>Body responsible for review:</b>  | Namibia Training Authority |