

Domain**ELECTRICAL ENGINEERING - CORE****Title:****Conduct insulation resistance tests****Level: 2****Credits: 2****Purpose**

This unit standard is intended for those who conduct insulation resistance testing. People credited with this unit standard are able to plan and prepare for work; demonstrate knowledge of insulation resistance theory and operation of an insulation resistance tester; carry out insulation resistance tests on electrical equipment and cables; test electrical insulating oil; and clean-up work area.

This unit standard is intended for those who work in electrical workplace environment.

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 insulation resistance tests on electrical equipment and cables are carried out.

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

4. Electrical circuit of insulation equivalence is limited to a parallel resistor/capacitor circuit.

5. Specific tests are limited to one-minute spot checks, step voltage tests and polarisation index tests.

6. Glossary of terms:

- 'SANS' refers to South Africa National Standards

7. 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.
- SANS 10142-1
- SANS 10142-2

- Namibia Electricity Safety Code 2009: Electricity Act No. 4 of 2007

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: Plan and prepare for work

Performance criteria

- 1.1 Work instructions, including plans, specifications, quality requirements and operational details are obtained, confirmed and interpreted.
- 1.2 Worksite is inspected for hazards and corrective action is taken according to the regulations relating to the health and safety of employees at work.
- 1.3 Personal Protective Equipment are selected in line job and safety requirements
- 1.4 Safety requirements are followed in line with safety plans and policies.
- 1.5 Tools and equipment selected to carry out tasks are consistent with job requirements, checked for serviceability, and any faults are rectified or reported prior to commencement.
- 1.6 Material quantity requirements are calculated in line with plans, specifications and quality requirements.

Element 2: Demonstrate knowledge of insulation resistance theory and operation of an insulation resistance tester

Range

Insulation materials may include but not limited to PVC (poly vinyl chloride), paper and other cellulose type materials, XLPE (cross-linked polyethylene), insulation oil and mica.

Properties of materials may include but not limited to ability to withstand applied voltage, ratio of insulation resistance to length and amount of conductor material in proximity.

Performance Criteria

- 2.1 Insulation materials and their physical properties are explained.
- 2.2 Variation of insulation resistance with temperature is explained.
- 2.3 Equivalence of electrical circuits to insulations is described.
- 2.4 The operation of an electrical insulation resistance tester is explained.
- 2.5 The use of Ohm's Law to determine insulation resistance values from the application of a known direct current voltage is explained.
- 2.6 Measurement of current through insulation material is explained.

Element 3: Carry out insulation resistance tests on electrical equipment and cables

Range

Test may include but not limited to tests on transformers, cables, switchgear, electrical installations, bushings and surge arrestors.

Performance Criteria

- 3.1 Technical specifications and performance standards of the item to be tested are selected and interpreted.
- 3.2 Insulation resistance tester is rendered ready for use.
- 3.3 Insulation resistance tester is connected, operated and performance verification is carried out.
- 3.4 Specific insulation resistance tests are conducted using required test procedures.
- 3.5 Test results are analysed to determine the condition of equipment and/or identify faults.
- 3.6 Insulation test results are recorded.

Element 4: Test electrical insulating oil

Range

Oil testing may include but not limited to dissolved gas analysis (DGA), dielectric breakdown, interfacial tension, Carl Fisher test, acidity and colour moisture content test.

Performance Criteria

- 4.1 Technical specifications, test specifications and performance standards are selected and interpreted.
- 4.2 Required tests and testing procedures are identified.
- 4.3 Test equipment are set up, calibrated and certified according to manufactures' requirements.
- 4.4 Test equipment compliance status is verified in line with manufactures' requirements.
- 4.5 Hazards associated with the testing of electrical insulation oil are identified and safety measures are applied.
- 4.6 Oil sample tests and relative humidity tests are carried out and recorded in line with approved standard procedures.
- 4.6 Test results are interpreted for compliance with the standard required.
- 4.7 Compliance or non-compliance documentation is completed for each sample tested.

Element 5: Clean-up work area

Performance Criteria

- 5.1 Work area is cleared, cleaned, restored and secured in line with workplace procedures.
- 5.2 Tools and equipment are cleaned, checked and stored in line with manufacturer specifications and workplace procedures.
- 5.3 Materials and wastes are disposed of, reused, or recycled in accordance with legislation, regulations, codes of practice and job specifications.

Registration Data

Subfield:	Electrical Engineering
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