

**Domain****SOLAR INSTALLATION****Title:****Commission basic Solar Home Systems  
and Photo Voltaic Pumping systems****Level: 3****Credits: 5****Purpose**

This unit standard specifies the competencies required to commission Solar Home Systems and Photovoltaic Pumping systems up to 500 Watts. It includes the following elements: inspect system installation correctness; train the user in basic maintenance and system functioning; inspect all connections and mountings; test installations; prepare installation records and prepare installation records. This unit is intended for those who work as Solar technicians.

**Special Notes**

## 1. Entry information:

## Prerequisites

- *1641: Apply safety rules and regulations in an electrical installation work environment or demonstrated equivalent knowledge and skills.*
- *1647: Install Solar Home Systems*
- *1654: Demonstrate knowledge of Solar Water Heating principles and technologies.*
- *1657: Install Photo Voltaic Pumps.*

2. To demonstrate competence, at a minimum, evidence is required of identification of deficiencies of SHS and PVP systems, and equipment through inspection and testing and ability to remove, clean and replace worn parts.
3. Tools, equipment, accessories and materials may include but are not limited to removing/fixing tools (including appropriate electrical tools and measuring instruments), calculators, pencil/pen, manufacturers' manuals, installation manuals, maintenance manuals and guides, schedules, spare components, formats and instructions for the estimation of quantities.
4. Assessment evidence may be collected from a real workplace and/or an appropriate simulated realistic environment in which system operations are carried out.
5. Performance of all elements in this unit standard must comply with all relevant workplace requirements and manufacturers' specifications.
6. Glossary of terms:
  - *'Isolation and lockout procedures'* refer to isolating the PVP from the water supply and electrical source of supply where applicable.
  - *'Thermal insulation'* refers to minimizing heat loss in any heat transfer media.
  - *'Specifications'* refers to any, or all of the following: manufacturers' specifications and recommendations, workplace specific requirements, national and international standards and legislations.

- 'ISO' refers to International Organization for Standards.
  - 'SANS' refers to South African National Standards.
  - 'SHS' refers to Solar Home System.
  - 'PVP' refers to Solar Water Heater.
  - 'INSOLATION' refers to Incoming Solar Radiation.
7. Regulations and legislation relevant to this unit standard include the following:
- Labour Act No. 11 of 2007.
  - National Energy Fund Act of 2000.
  - 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 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: Inspect system installation correctness**

##### **Range**

The verification of installation correctness may include but not limited to cross-checking and testing the entire installation (under unpowered condition) to ensure correct installation.

##### **Performance criteria**

- 1.1 The system installation completeness is verified.
- 1.2 The system installation safety is verified.
- 1.3 All SHS components of the installation are inspected for robust and permanent.
- 1.4 Pump and pump components are inspected.
- 1.5 The system performance is verified.

#### **Element 2: Train the user in basic maintenance and system functioning**

##### **Range**

The element includes but not limited to tools and methods of training the users on the functionality, operation and use of the system. The dos and don'ts should be considered.

##### **Performance criteria**

- 2.1 System start-up and shutdown procedures are explained to the user.
- 2.2 System safety procedures are explained to the user.
- 2.3 Maintenance and operation procedures are explained to the user.
- 2.4 Equipment clearance requirements are explained.
- 2.5 Normal operational performance is explained.

### **Element 3: Inspect all connections and mountings**

#### **Performance criteria**

- 3.1 Mounting structure and jointing materials are checked.
- 3.2 Structures roof members and correct fixing methods are inspected.
- 3.3 Correctly place flashing and other waterproofing measures are checked.
- 3.4 Electrical connections are checked.
- 3.5 PV components and PV pump component are checked and inspected for faulty.

### **Element 4: Test installations**

#### **Performance criteria**

- 4.1 Mechanical connection integrity are tested.
- 4.2 System grounding is tested and verified.
- 4.3 Electrical connection are tested and verified.
- 4.4 Polarity test is done.
- 4.5 DC voltages (string, output) is measured and tested.
- 4.6 Inverter operation is tested and verified.
- 4.7 DC currents is measured and tested.
- 4.8 AC system values is measured and tested.
- 4.9 Irradiance levels are measured.
- 4.10 The durability test of the motor-pump-inverter set has been carried out.
- 4.11 Pump system components test is carried out.

### **Element 5: Prepare installation records**

### **Performance criteria**

- 5.1 Installation record is prepared as per system requirement.
- 5.2 Installation record purpose is described.
- 5.3 Installation record is documented in accordance with established policies and procedures.

### **Registration Data**

<b>Subfield:</b>	Electrical Engineering
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