

**Domain****SOLAR INSTALLATION****Title:****Design basic domestic Solar Water  
Heater****Level: 3****Credits: 3****Purpose**

This unit standard specifies the competencies required to design basic Solar Water Heater for domestic purposes. It includes the following elements: perform site assessments, determine hot water demand; Determine pipe sizes and fittings, valves and back up heating; calculate collector sizes, determine control units and draw schematic diagrams. This unit is intended for those who work as solar technicians.

**Special Notes**

## 1. Entry information:

## Prerequisites

- 1642: Demonstrate basic knowledge of electricity
- 1647: Draw and interpret basic technical drawings
- 1649: Perform basic estimations, measurements and calculations
- 1655: Develop and interpret intermediate technical drawings
- 1643: Demonstrate basic knowledge of environmental issues relating to solar energy installations
- 1645: Demonstrate knowledge of plumbing principles

2. To demonstrate competency, at a minimum, evidence is required of calculating correct sizes of collectors, storage, piping & fittings, control units, back-up heating as well as drawing and interpreting schematic drawings of complete systems using common and standard symbols including labelling all components and connections correctly.

3. Tools, equipment, accessories and materials may include but are not limited to removing or fixing tools, calculators, pencil or pen, manufacturers' manuals and guides.

4. Assessment evidence may be collected from drawings, real workplace or an appropriate simulated realistic environment in which system designs 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:

- 'SWH' refer to Solar Water Heater.
- 'AC' refers to Alternating Current.

- 'DC' refers to Direct Current.
7. Regulations and legislation relevant to this unit standard include the following:
- Labour Act No. 11 of 2007.
  - Petroleum Products and Energy Amendment Act No. 2 of 2005.
  - National Energy Fund Act of 2000.
  - Gas Act (Draft 2b).
  - Occupational Health and Safety Regulations No. 18, 1997 and all subsequent amendments.
  - ISO 14001 (Environmental Management Standard) and all subsequent amendments to any of the above.

### **Elements and Performance Criteria**

#### **Element 1: Perform Site Assessment**

##### **Range**

Site assessment may include but is not be limited to workplace inspection, equipment defect identification, assessment of conditions and hazards and determination of work requirements.

##### **Performance criteria**

- 1.1. Angle of the roof is calculated and determined.
- 1.2. Factors affecting solar power generation are determined and listed.
- 1.3. Integration of SHS with the existing networks is determined.
- 1.4. Condition of the roof is established.

#### **Element 2: Determine hot water demand**

##### **Range**

Hot water demand included but not limited to the domestic use.

##### **Performance criteria**

- 2.1 Number of household members is determined.
- 2.2 Average hot water usages is determined.
- 2.3 Peak hours for hot water usage is determined.

#### **Element 3: Determine pipe sizes and fittings, valves and back up heating**

##### **Range**

Valves and flow control devices include stop valves and may include flow control valves, non-return valves and pressure and temperature control valves. Back up heating refers to but is not limited to electrical back up.

### **Performance criteria**

- 3.1 Pipe size and length are calculated.
- 3.2. Required valves are selected.
- 3.3. Correct fittings are selected.
- 3.4. Back up heating is selected.

### **Element 4: Calculate the collectors size**

#### **Range**

Collector size is calculated and appropriate application such as water heater; space heating; cooling are included but not limited to collector types such as evacuated tube, flat plate.

### **Performance criteria**

- 4.1. Water demand is determined.
- 4.2. Collector type is determined according to suitability.
- 4.3. Peak hours for hot water usage is determined.
- 4.4. Correct tank size is determined.

### **Element 5: Determine control units**

#### **Range**

Control units may include but is not limited to; flow meters and temperature and pressure valves.

### **Performance criteria**

- 5.1 Power demand determined.
- 5.2. Type of system AC or DC determined.
- 5.3. Factors affecting control units are determined

### **Element 6: Draw a schematic diagram**

#### **Range**

Schematic diagram may include the general outlay of the system with all components indicated by standard symbols and may be labelled.

### **Performance criteria**

- 6.1. All parts, components and symbols are correctly drawn.
- 6.2. All parts, components and symbols in the schematic drawing are correctly labelled.
- 6.3. All parts, components and symbols in the schematic drawing are scaled.

### **Registration Data**

<b>Subfield:</b>	Electrical Engineering
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