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SOLAR WATER HEATER CATALOGUE



GREEN ENERGY FOR A HEALTHY PLANET

Company profile

About Solsquare

Solsqr (Pty) Ltd is a South African company, specialising in renewable energies, such solar water heating. Solsquare was established in 2007 in Pretoria and has since established offices in Cape Town and Windhoek, Namibia.

Through its affiliation with respected local suppliers and its strong ties with international partners, Solsquare is capable of offering its clients state of the art and sustainable renewable energies solutions. Solsquare has access to a global network of over 2,500 highly skilled specialists, with experience in over 5000 complex installation plants, ranging from 20 W to 5 MW output generation. This provides Solsquare's clients with access to competent installation, commissioning, training, finance and maintenance services.

Solsquare's unique product range and support structure offers its clients innovative solutions, which enable them to run systems which are reliable, yet cost-effective. It does this by customizing its clients' long-term energy requirements to the available infrastructure.

Why Solar Power

As anyone who has ever spent time in the South African sun knows, the sun is a powerful source of heat. Harnessing this heat to heat water is easy, effective and, best of all, free. Electric geysers account for between 25% to 40% of household electrical usage. A solar water heater can meet up to 90% of household hot water requirements, without using electricity. This means that using a solar water heater will save electricity, thus saving money and contributing towards reducing green house gas emissions.

Annual Solar Radiation for South Africa

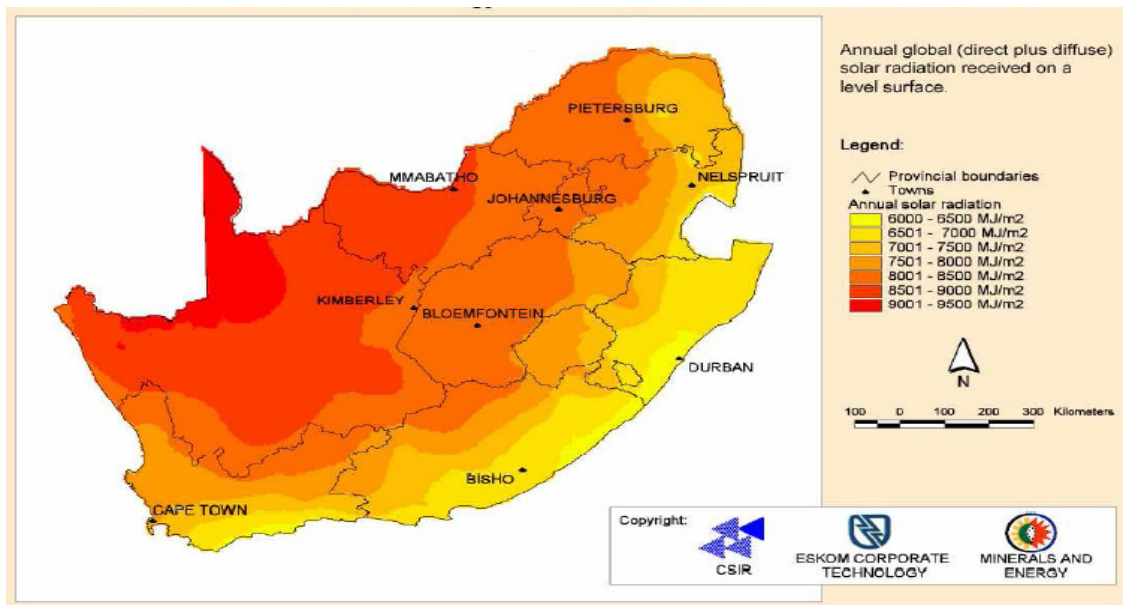


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1 Introduction

Solar water heaters, which heat water for personal use, are classified as either being open (direct) or closed (indirect) systems. An open/direct system has the household water circulating through the collector panels. This system is ideal for locations where the ambient temperature never falls below freezing and where the water quality is good. Since most areas in South Africa regularly have temperatures below freezing in winter as well as regular incidences of frost, and because of the high calcium content in many areas, the open/direct system is generally not considered viable in this country.

In a closed/indirect system the household water used does not circulate through the collector panels. The agent used in the collector panels, generally a glycol and water mixture, is heated and that heat is then transferred indirectly, i.e. without coming into contact with the household water. Closed/indirect systems are typically used in areas where frost occurs and when water quality is poor.

The glycol solution that is used in the collector panels contains USP propylene glycol. This specific glycol is considered generally safe for use in foods by the American FDA. This means that even if there is a leak, and the glycol mixes with the household water, there is no risk to humans or animals.

Thermosyphon vs. Split Systems

Thermosyphon systems are complete on-roof hot water systems, in which the storage tanks and solar collectors are mounted on the roof as a unit. Thanks to the sophisticated functional principle of the Thermosyphon, drinking water can be heated very economically and efficiently.

The cold and hot water supply lines are connected to the domestic water system. Due to the solar radiation and differences in the specific weight of cold and hot water, the heated water rises to the top of the collector where it flows into the storage tank and displaces the cold water. The cold water in turn flows into the collector and is heated there.

The heated water then flows into the hot water lines and can be used directly for cooking, washing or showering. Not only is this system often the most economical solution, but the technology is foolproof and requires almost no maintenance.

Split systems use a pump to move the liquid through the collectors and into the heat exchange in the storage tank, where the heated, pumped glycol solution will heat the household water.

Though this system has more components and is hence more expensive, its advantages are twofold:

- The storage tank does not need to be placed directly above the collectors, allowing the tank to be placed up to 20m away from the collectors.
- The system is more efficient as the pump regulates the flow rate of the glycol solution through the system.

If the sun does not shine for several days or the water consumption rate is abnormally high, the storage tank thermostat, used in both system types, automatically activates an additional electric heater. This ensures that hot water is always available.

2 Thermosyphon Systems

2.1 About the Manufacturer

The Conergy Group, based in Germany, was formed in 1998 and is now one of the world's leading companies dedicated to renewable energy technologies. Conergy has to date installed over 100,000 m² of solar hot water collectors making it one of the leading international providers of renewable energy systems.

2.2 System Overview



Australian Standard



SANS6211

Figure 2.1 Conergy Thermosyphon System



Features & Benefits:

- German designed system
- No moving parts – low maintenance
- Quality design & stylish appearance
- Electric boosting with all systems (gas option available)
- Flat and pitched roof mounting systems
- Pay back in under 5 years
- Up to 90% of your hot water free from the sun
- Hot water in all weather conditions
- Save up to 3.4 tons of emissions per year
- Long life in any environment
- Comprehensive 5 year warranty inclusive

2.3 Components

2.3.1 Storage Tanks (150 liter: 65-241-191 and 250 liter:65-241-193)



SABS 151

SABS60335

Figure 2.2 Conergy 150 liter Tank



Features:

- 150 & 250 liter tank sizes
- Vitreous enamel lined steel with sacrificial anode for long life
- Functions in hard water areas
- Durable Colorbond® and Polypropylene casing
- Robust construction with high density thermal insulation

Figure 2.3 Conergy 250 liter Tank



	150 liter	250 liter
Storage Capacity (L)	150	250
Boost Capacity (electric/gas)	90L/26L- min	90L/26L - min
Tank weight empty (kg)	54	101
Tank Size (W x H x L/mm)	624x589x1237	624x589x2047
Booster element rating 220/250 V (KW)	2.4	2.4

2.3.2 Flat Plate Collector (65-240-047)

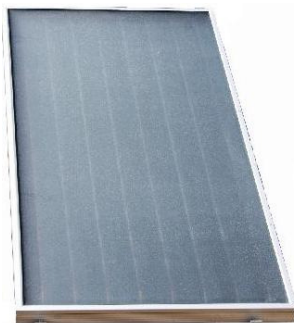


Australian Standard



SANS 1307

Figure 2.4 Conergy Flat Plate Collector



Features:

- Toughened glass and durable copper waterway tubes
- EPDM rubber seals for durability and reliability
- Black chrome surface on copper substrate for maximum efficiency
- Housed in insulated aluminium to protect against physical damage

Collector Size (H x W x D/mm)	2200x1000x80
Total Collector area (m²)	2.2
Collector weight empty (kg)	30
Collector weight full (kg)	32
Collector Material	Aluminum

3 Split Systems

We offer either flat plate or evacuated tube collectors with the split system. The split system, which requires a pump to move the glycol solution through the system, can either have an electrical or solar pump.

Examples of systems with the two different collectors are shown below. Both systems below have both pump types, to illustrate the parts required for a fully functioning solar water heating system.

3.1 Flat Plate Collector Systems



SANS 6211
SANS 1307

Figure: 3.1 Split Systems Front view:



Figure: 3.2 Split Systems Back view:



3.2 Evacuated Tube Systems



SANS 6211
SANS 1307

Figure: 3.3 Split Systems Front view:

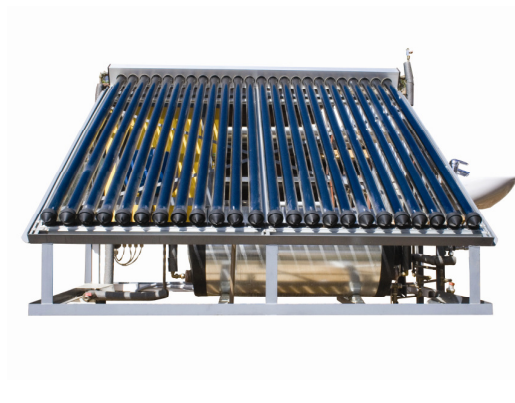


Figure: 3.3 Split Systems Back view:



3.3 Components

3.3.1 Flat Plate Collector (65-240-047)



SANS 1307

Figure 3.4 Conergy Flat Plate Collector



Features:

- Toughened glass and durable copper waterway tubes
- EPDM rubber seals ensure durability and reliability in extreme climatic conditions
- Black chrome surface on copper substrate for max efficiency
- Housed in insulated aluminium to protect against physical damage

Collector Size (H x W x D/mm)	2200x1000x80
Total Collector area (m ²)	2.2
Collector weight empty (kg)	30
Collector weight full (kg)	32
Collector Material	Aluminium

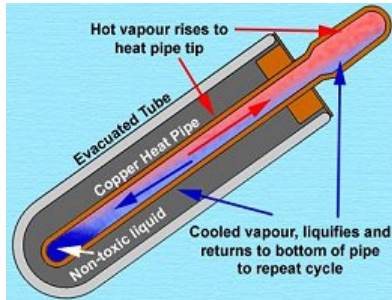
3.3.2 Evacuated Tube Collector (Part code: 25-P(12, 18, 24 or 36)-FR/PR)*

Figure 3.5 Evacuated Tube Collectors



SANS 1307

Figure 3.6 Cross Section of Evacuated Tube Collector



Evacuated tube collectors use two glass tubes, in between which a vacuum has been created. The outer glass tube and the vacuum within protect the absorbent coating and structural materials from corrosion. The absorbent coating is most often a thin layer of barium.

The heat from the absorbent coating is transferred to the heat conveyance fluid. The fluid is an evaporating-condensing liquid that evaporates in the collector tubes, and then transfers the latent energy (heat) to the cold water in the tank, through condensation. Heat transfer is always in one direction - from absorber to the tank and never the reverse. As each tube is independent, individually damaged tubes can be replaced without interference to the still-functioning system. Tube damage is indicated by the tubes turning white when the vacuum has been broken.

Below is a schematic representation of an evacuated tube type collector. Each company has their own, usually patented, evacuated tube technology; the drawings below are merely representations to explain the concepts.

Specifications:

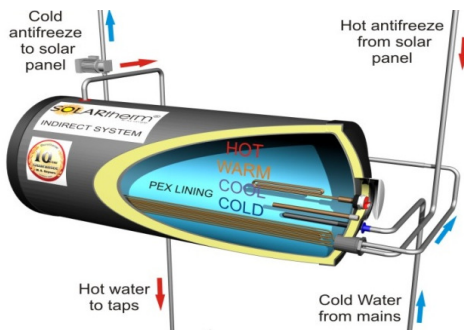
Outer Glass tube thickness	2 mm
Diameter of Tube	58 mm
Tube length	1800 mm

* Product Code Key:

25-	P(12, 18, 24 or 36)	FR/PR
Split system	Number of Tubes	Flat or Pitched Roof

3.3.3 Storage Tank (45-(100, 150, 200, 250 or 300)-010)*

Figure 3.6 Split System Storage Tank



SABS 151

The Solartherm® products use a 2.5 mm Pex (cross linked polyethylene) lining to prevent corrosion and reduce maintenance.

The boiler material is internally welded 2.0 mm steel. The casing is galvanized steel and is insulated with 25 mm high-density poly-urethane.

	100 Liter	150 Liter	200 Liter	250 Liter
Power Rating	1 KW	2 KW	3 KW	3 KW
Outside Dimension	510 ø x 800	510 ø x 1100	510 ø x 1400	510 ø x 1580
Weight	35kg	45kg	57kg	73kg

* Product Code Key:

45-	(100,...300)	010
Split system	Number of Tubes	Supplier Reference

The following parts are contained in the parts kit of the split system, and are not sold individually to customers. The item codes for the part kits are:

25-	(100, ... 300)	PPV/PEP
Split system	Tank Size	PV pump, or electrical pump

3.3.4 Pumps

The pumps are used to actively move the heated liquid through the collectors into the tank, to heat the household water. Both pump types are illustrated in the figures below.

Figure 3.7 Photovoltaic Pump



The photovoltaic (PV) pump requires more hardware and is more costly than the electric pump. However with a Direct Current (DC) pump, it is a carbon neutral solution, and can further reduce electric costs.

The advantages of the Laing pump are:

- soft start at very low in-rush current
- (soft start algorithm, less than 1 Watt required)
- economical and powerful
- long life, blockage free and maintenance free
- RF (radio frequency) suppressed
- protection against reverse polarity
- micro processor optimized flow

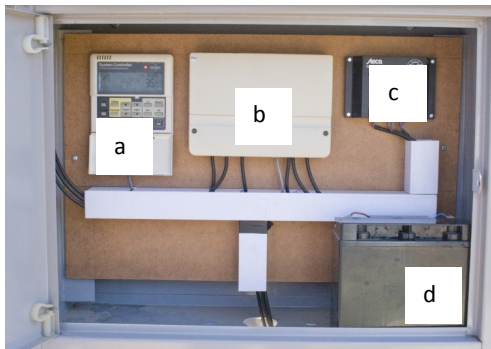
3.3.5 Photovoltaic Panel

Figure 3.9 Solar (photovoltaic) Panel



3.3.6 Controller for Split Systems

Figure 3.10 Controller Box for PV Split System



- System Controller
- Junction Box
- Charge Controller
- Battery

Figure 3.8 Electric Pump



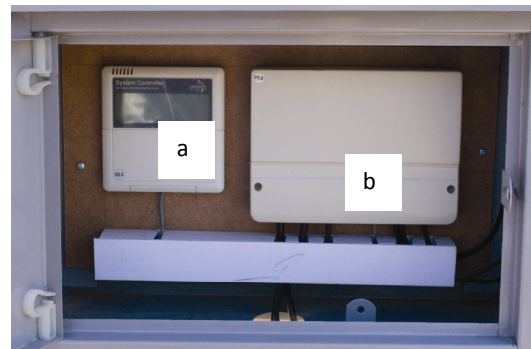
The electric pump, which is less expensive and requires less hardware than the PV pump, runs off grid electricity, thus this system is NOT carbon neutral, and electricity cost reduction is lower.

- Housing from green cast iron.
- Impeller from polypropylene.
- Chrome high-grade steel wave with Grafit sliding bearings.
- All rotating parts are immersed in the fluid being handled.
- A shaft seal, being subject to wear and tear, is not required
- Fluid lubricates the shaft bearings and act as coolant to bearings and rotor.
- The pump is completely maintenance free.

Photovoltaic panels use sunlight to generate direct current electricity. A 20 Watt peak panel is used to charge a 12 volt battery. This battery is used to drive the DC pump. A battery is required to ensure that the pump will run, whether there is sufficient sunlight or not.

The PV panel will be mounted with the collector.

Figure 3.11 Controller Box for Electrical Split System



- System Controller
- Junction Box

The controller box for the split system contains the following:

- a. **System controller** - Main functions are:
- Clock display
 - Temperature difference on/off
 - Maximum tank temperature monitoring
 - Frost protection
 - Temperature controlled hot water circulation pump
 - Time controlled hot water circulation pump
 - Temperature controlled auxiliary heating during three time section
 - Protection functions (a. Memory protection, b. anti-bacteria protection)

The advantages of this system controller are:

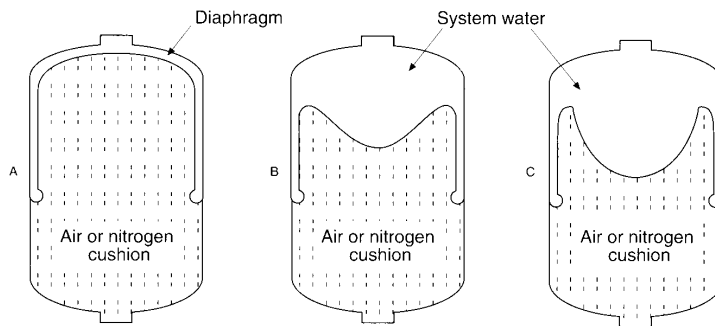
1. Self power consumption: <3W
 2. Measures temperature with-in 2 degrees accuracy.
 3. Measurement range of 120 degrees.
- b. **Junction Box** – Used to conceal and protect electrical junctions
- c. **Battery** – The battery is a 12V 7 Amp battery
- d. **Charge Controller** – Ensures that the batteries are not overcharged by the solar panels during the day and prevents the solar panels draining the batteries at night. The charge controller also prevents the loads placed on the batteries from discharging the batteries too deeply.

3.3.7 Expansion Vessel

Figure 3.12 Expansion Vessel



Anytime the water pressure rises, it will push against the diaphragm and gently compress the air. The compressibility of the air cushions the pressure shock and relieves pressure in the system that could otherwise damage the plumbing.



A. When system is filled, no water enters tank when cushion and water pressure are in equilibrium

B. As temperature increases, diaphragm moves to accept expanded water

C. When water rises to maximum, full acceptance of expansion is achieved

The 24 liter vessel is made from high grade steel which is coated with epoxy. The bladder is made from butyl rubber.

3.3.8 Vacuum Breaker

Figure 3.13 Vacuum Breaker



Prevents water from draining out when the water supply to the system is cut off.

3.3.9 Temperature Pressure Valve

Figure 3.14 TP Valve



A Temperature Pressure valve is installed on a geyser. If the pressure inside the tank exceeds safety levels, the valve will drain water to relief the pressure.

3.3.10 Pressure Control Valve

Figure 3.15 Pressure Control Valve



The pressure control valve is installed in every house as a matter of course. It is required to ensure that all water is at 400 kPa.

4 Further Information

Figure 4.1 Insulated Piping



Having pipes insulated, though an additional costs, has the following advantages:

- Reduces heat loss, thus further electrical savings, and wait time for hot water.
- Helps prevent injury
- Noise control

Figure 4.2 Elbow Connection



A threaded elbow connector made from brass is used to connect the collector, pump and tank.

5 Installation and Maintenance

The solar water heating system and its components are covered by a 5 year warranty against defective factory parts or workmanship from the date of installation. The system must be installed by an approved installer, to ensure the quality and efficiency of the system.

The Solsquare Solar Water Heater is designed and installed so that there is minimal maintenance required by the owner. Personally inspecting or servicing of the system by the owner is not recommended.

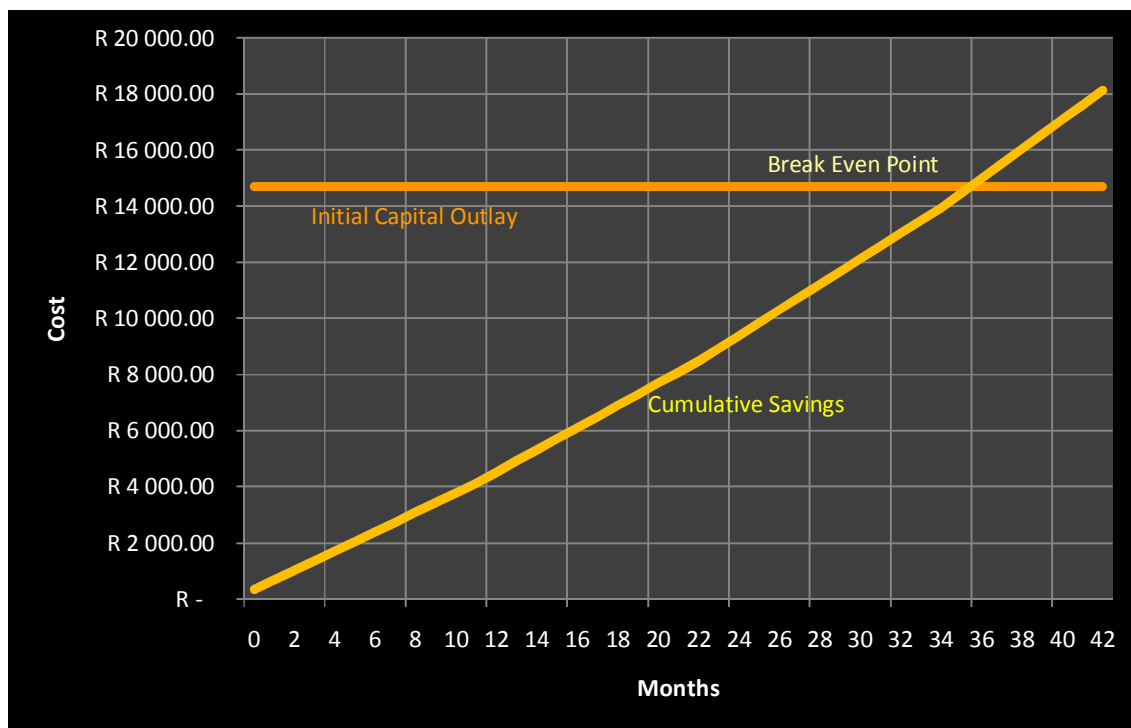
6 What are the benefits of this system?

- Reduction of electricity bill
- Reduction of carbon imprint, which is good for the environment
- no chance of freezing and pipe damage as the system is an indirect system
- None of the components are harmful to people, animals or the environment
- Tempered glass cover, which is hail resistant
- Adds value to your home
- Possible rebates from Eskom

7 Payback

At the current electricity prices with no substantial price increase, the payback, for a family of four, is under 4 years. However, as we know electricity prices increases by more than inflation. At a conservative cost increase of 15% per annum, the payback period for a family of 4 drops to three years. This is illustrated in the figure below.

Figure 7.1 Payback Period



8 Contact Us

We are here for you



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