Low Pressure SOLAR SYSTEMS

The Facts

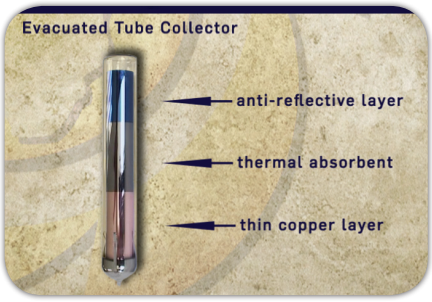
- A Low Pressure Solar System is a direct coupled system
- A Low Pressure Solar System operates through thermosiphoning
- Installing a tempering (mixing) valve is *Not Negotiable*
- All fixtures & fittings installed on any dwelling needs to comply with SABS regulations
- There is no electrical element in a Low Pressure System
- In order to claim an Eskom rebate on the installation of the Low Pressure System, the house needs to be connected to electricity and all the requirements as set out by Eskom strictly adhered to

What is a Low Pressure Water Heater?

A Low Pressure Solar System is a direct coupled system, which means that the collector and main tank are inseparable and needs to be mounted outside on the roof. A Low Pressure System is open vented and gravity fed, and usually operates at under 0.5 bar of pressure. The difference in height results in one bar of pressure. The geyser in an average household operates at anything between 4 - 6 bar of pressure and is regarded high pressure. The municipal pressure is reduced by feeding it into a filter tank, which works on the same principal as a toilet cistern using a ball valve; this in turn feeds the main tank. In a Low Pressure Solar System the tank and evacuated tubes are filled with water, and operated on the principle of thermosiphon.

What is Thermosiphon?

Cold water has a higher density than hot water, and will descend while hot water will rise. The hot water in the collector (evacuated tubes) rises into the main tank and the colder water in the tank descends into the tubes causing a natural circulation effect called *thermosiphon*. A thermosiphon system is passive solar technology, which requires very little maintenance.



What is an Evacuated Tube?

The Evacuated Tube is a double walled glass cylinder of which the outer space has been evacuated for insulation to prevent heat loss. Thermal absorbent applied to the inner wall of the tube captures the radiated (light) energy and transfers it to the water inside. The thermosiphon process starts as soon as the water in the tube is heated.

Can the system withstand hail?

The SABS performs stringent tests on all evacuated tubes to check that it can withstand hail - tubes that pass the SABS tests should be able to withstand hail of up to golf ball size. Our tubes are typically 10% thicker than the minimum requirements specified by the SABS.

What happens in freezing conditions?

The evacuated tubes are insulated as explained above, while the stainless steel main tank is placed inside a polyurethane casing that also insulates it. If the system is installed according to SABS specifications with proper piping and lagging it will be freeze resistant, which means that in extreme conditions any freezing that may occur will not cause permanent damage to it.
Once again the SABS performs stringent tests in this regard.

Low Pressure SOLAR SYSTEMS

Why the Tempering Valve?

The process of heating the water in a thermosiphon system continues as long as enough solar radiation is available, which is South Africa is more than sufficient. This means that the water in a Low Pressure System regularly exceeds 55°C which is the maximum permissible temperature allowed by the SABS to be dispensed from a geyser; this is already scalding hot. The water in the main tank has been known to reach boiling point in certain instances, which can be life threateningly dangerous. The tempering valve mixes hot water from the main tank with cold water and thus regulates the temperatures of the water being dispensed to a safe level as set on the valve. This also increases the capacity of the Low Pressure Solar System well above the size of the main tank.

Can a Low Pressure Solar System be used in a high pressure environment?

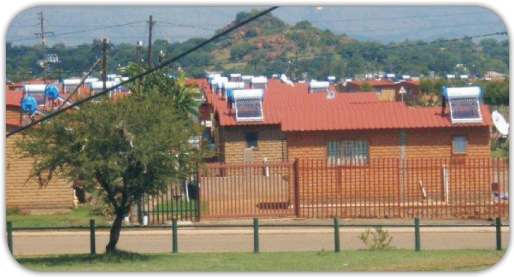
No, if the pressure on the Low Pressure Solar System is too high the main tank may be damaged - a safety release valve is installed to prevent this. However, many of the older homes actually operate in a low pressure environment where the municipal water feeds a large filler tank in the roof of the house, which then feeds the geyser and taps in the house. A Low Pressure Solar System can be used as a pre-feeder to the geyser in this instance.

What makes our Low Pressure Solar Systems different?

- Correctly sized to cater for our needs and environment - not to maximise Eskom rebates
- Glass used in evacuated tubes are thicker than SABS requirements
- Stainless steel feeder tank
- Stainless steel used in main tank thicker than SABS requirements
- Patented design optimises working of tempering valve, which makes the system safe
- Available in 100, 150 & 200 litre Low Pressure Solar Systems

Potential Applications

- Low Cost Housing
- Farm Installations
- Camping Resorts
- Game Farms
- Pre-feeders to Low Pressure Geysers
- Dad's outside shower at the beach house, Mountain Cottage, Fishing Shack



Specifications

Code	Capacity	Packaging	Dry Weight	Filled Weight
CA47-1512	100 litres	1 of 1510 x 550 x 570 mm 1 of 1570 x 230 x 200 mm	34 kg 21 kg	155 kg
CA47-1518	150 litres	1 of 1910 x 550 x 580 mm 1 of 1570 x 330 x 200 mm	45 kg 30 kg	225 kg
CA47-1524	200 litres	1 of 2060 x 580 x 550 mm 1 of 1870 x 200 x 110 mm 2 of 1570 x 230 x 200 mm 1 of 290 x 230 x 230 mm	36 kg 19 kg 42 kg (Total) 1 kg	298 kg

Retro fit SOLAR SYSTEMS

Retrofit Solar Water Heaters

It is possible to use your current electric geyser in a retrofit installation, which may qualify for an Eskom rebate if all the requirements are adhered to. This is not as efficient as using a solar geyser, and is most probably an active system. It is possible that in some instances a thermosiphon system may be used in a retrofit application.

What is an Active System?

An Active Split System uses a pump and a controller to circulate the water between the collector and the tank. The collector can either be an evacuated tube - or a flat plate collector, and is placed higher than the geyser, which is probably inside the roof. An active split retrofit system consists of your existing geyser, a collector, a pump and an intelligent controller. A geyser blanket and a 2kW element will also be required.

What is the risk in a retrofit application?

In an electric geyser the thermostat activates the element as soon as the pre-set temperature is reached, which generally keeps the water in the geyser within a certain temperature range. With a solar geyser the water is ideally only heated by the sun, and that over a longer period of time than electrically. That means that in a solar water heater the geyser experiences larger fluctuations between hot and cold than usual, and chances are that the enamel coating will crack and start leaking. The manufacturers of electric geysers may also refute warranty claims if the configuration of their geyser is changed in any way.

Our Collectors

A Flat Plate Collector absorbs the radiated energy onto flat sheets of metal covered by a specialised coating; this improves the absorption rate. Water, circulating in copper piping attached to these sheets, is heated by this energy. A refracted glass plate covers the collector to trap the radiation from the sun, as well as to insulate it to some extent from the elements.

SDA's Flat Plate Collector of choice is locally manufactured by Powerz-On and carries the SABS mark of approval. The ST-range of collectors has been designed for active systems and has been tested with a 150 litre Kwikot geyser which qualifies for an Eskom rebate. Powerz-On, a subsidiary of the CSI Group, backs their collector with a 10 year warranty.

An Evacuated Tube Collector consists of glass tubes and a manifold. The evacuated tube is a double walled glass cylinder of which the outer space has been evacuated for insulation to prevent heat loss. Thermal absorbent applied to the inner wall of the tube captures the radiated energy. 3 Layers of coating applied fulfil the following functions:

- The outer layer is an anti-reflective layer.
- The next layer is the thermal absorbent which maximizes the absorption of the radiation energy.
- The last is a thin copper layer that transfers the energy to the aluminium fin, which it is in contact with.

The fin is wrapped around a copper heat pipe in the core of the tube. The heat rises to the bulb at the top end of the heat pipe, which slots into the manifold. Water circulating through the heated manifold is thus warmed.

We have available a retrofit 150 litre evacuated tube system tested with a Kwikot geyser for an Eskom rebate.

Retro fit SOLAR SYSTEMS

Our Retrofit Geyser

We have tested both the flat plate and evacuated tube collector with a Kwikot 150 litre geyser, which is the most common geyser sold in South Africa. Care should be taken with the retrofit installation to ensure that the Kwikot 5 year guarantee is not compromised.

Our Controller

The intelligent controller that we use is the Geyserwise Max, developed in South Africa and manufactured in China. This controller not only performs the basic power management of the element as required by Eskom; it also offers other features such as element failure and leak detection, frost and over heat protection and managing the power supply to the pump.

Our Pump

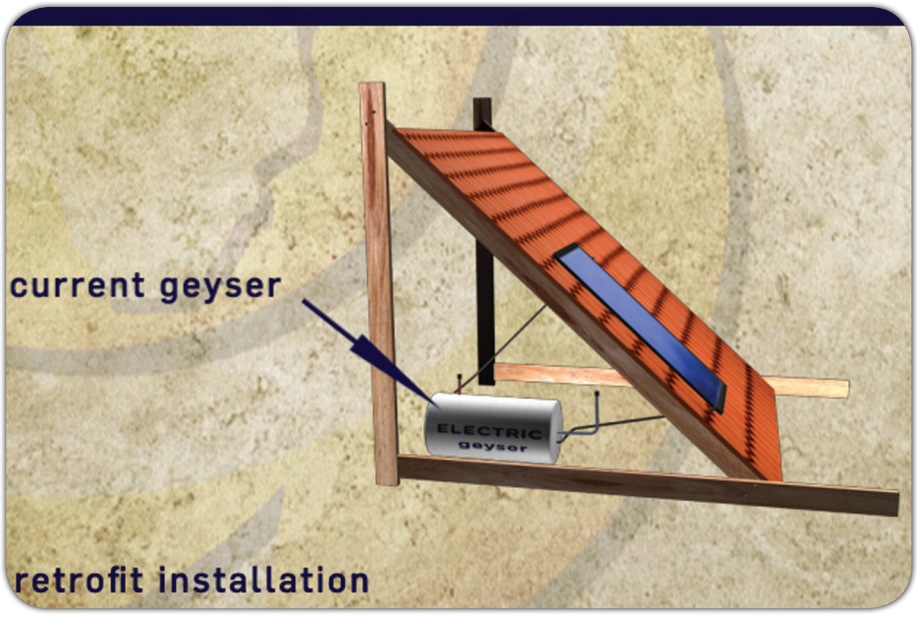
Experience has taught us to not compromise on quality. For domestic applications we use a Salmson 220v bronze pump with a magnetic motor that runs silently, is overload protected and resistant to scale build up. It uses 22 watts per hour, and is only activated when the water in the collector is >8°C warmer than that in the geyser. Battery back up is available if prolonged electricity outages are a concern. We have found the 12v solar pump options either unreliable or too expensive, but can offer it if required.

What about hail?

The SABS performs stringent tests on all systems to check that hail will not cause extensive damage to it - systems that pass should be able to withstand hail of up to the size of a golf ball.

What happens in freezing conditions?

The water in the copper pipes of a flat plate collector can freeze-up in really cold conditions. The risk is that the expanding water (ice) may cause the system to burst. A dump valve allows the water that is busy freezing to escape from the collector, avoiding damage. Evacuated tube collectors are a lot less prone to freezing as there is no water in the tubes, and the manifold is well insulated. Electronic protection against freezing is provided by the controller, which pulses hot water through the system to prevent this from happening.



Split Pump SOLAR SYSTEMS

Active Solar Water Heaters

An Active Split System uses a pump and a controller to circulate the water between the collector and the tank. The collector can either be an evacuated tube, or a flat plate collector; and is placed higher than the geyser which is probably inside the roof. An active split system consists of a collector, a tank or geyser, a pump and an intelligent controller.

Why an Active System?

Although it needs more components than a thermosiphoning system, thus costing more and with more chance of failure, an active system is aesthetically more attractive to most home-owners as only the collector is visible from the outside.

Our Collectors

A Flat Plate Collector absorbs the radiated energy onto flat sheets of metal covered by a specialised coating; this improves the absorption rate. Water, circulating in copper piping attached to these sheets, is heated by this energy. A refracted glass plate covers the collector to trap the radiation from the sun, as well as to insulate it to some extent from the elements.

SDA's Flat Plate Collector of choice is locally manufactured by Powerz-On and carries the SABS mark of approval. The ST-range of collectors has been designed for active systems and is available for 50-, 150- and 200 litre systems. Powerz-On, a subsidiary of the CSI Group, backs their collector with a 10 year warranty.

An Evacuated Tube Collector consists of glass tubes and a manifold. The evacuated tube is a double walled glass cylinder of which the outer space has been evacuated for insulation to prevent heat loss. Thermal absorbent applied to the inner wall of the tube captures the radiated energy. 3 layers of coating applied fulfil the following functions:

- The outer layer is an anti-reflective layer.
- The next layer is the thermal absorbent which maximizes the absorption of the radiation energy.
- The last is a thin copper layer that transfers the energy to the aluminium fin, which it is in contact with.

The fin is wrapped around a copper heat pipe in the core of the tube. The heat rises to the bulb at the top end of the heat pipe, which slots into the manifold. Water circulating through the heated manifold is thus warmed.

Our primary supplier of evacuated tubes is Pacific Solar who imports this from China with a SABS mark of approval and also provides a 10 year warrantee. The EVT's are available in 12-, 18- and 24 tube manifolds which can be used in 150-, 200- and 250 litre systems.

Our Geyser

A solar geyser differs from a regular electric geyser in that it has two extra ports to allow the water to circulate through the collector, it is better insulated to prevent heat loss and it is fitted with an element with a lower kW. Should there be not enough sunlight to heat the water the thermostat and element can still warm the water for you, provided that there is electricity.

We prefer to use the Solartherm geysers manufactured by WE Geyser in South Africa; with carries the SABS mark of approval and 10 year warranty. The geyser has a pex lining which makes it suitable for all water types, requires no sacrificial anode and has been proven to be 98% thermally efficient.

Split Pump SOLAR SYSTEMS

Our Geyser

A solar geyser differs from a regular electric geyser in that it has two extra ports to allow the water to circulate through the collector, it is better insulated to prevent heat loss and it is fitted with an element with a lower kW. Should there be not enough sunlight to heat the water the thermostat and element can still warm the water for you, provided that there is electricity.

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Our Controller

The intelligent controller that we use is the Geyserwise Max, developed in South Africa and manufactured in China. This controller not only performs the basic power management of the element as required by Eskom; it also offers other features such as element failure and leak detection, frost and over heat protection and managing the power supply to the pump.

Our Pump

Experience has taught us to not compromise on quality. For domestic applications we use a Salmson 220v bronze pump with a magnetic motor that runs silently, is overload protected and resistant to scale build up. It uses 22 watts per hour, and is only activated when the water in the collector is >8°C warmer than that in the geyser. Battery back up is available if prolonged electricity outages are a concern.
We have found the 12v solar pump options either unreliable or too expensive, but can offer it if required.

What about hail?

The SABS performs stringent tests on all systems to check that hail will not cause extensive damage to it - systems that pass should be able to withstand hail of up to the size of a golf ball.

What happens in freezing conditions?

The water in the copper pipes of a flat plate collector can freeze-up in really cold conditions. The risk is that the expanding water (ice) may cause the system to burst. A dump valve allows the water that is busy freezing to escape from the collector, avoiding damage. Evacuated tube collectors are a lot less prone to freezing as there is no water in the tubes, and the manifold is well insulated. Electronic protection against freezing is provided by the controller, which pulses hot water through the system to prevent this from happening.

Thermosiphon Solar Systems

Thermosiphon Solar Water Heaters

Our Thermosiphon Solar Water Heaters consist of a collector, a tank or geyser and a DB board timer. The collector can either be an evacuated tubes collector or a flat plate collector. The tank can be placed inside or outside the roof, as long as it is higher than the collector.

What is Thermosiphoning?

Cold water has a higher density than hot water, and will descend while hot water will rise. The water in the collector is heated by solar radiation and rises into the tank while the colder water in the tank descends into the collector causing a natural circulation effect called thermosiphoning that will continue until a state of equilibrium is reached. A Thermosiphon System is passive solar technology, which requires very little maintenance.

Our Collectors

A Flat Plate Collector absorbs the radiated energy onto flat sheets of metal covered by a specialised coating; this improves the absorption rate. Water, circulating in copper piping attached to these sheets, is heated by this energy. A refracted glass plate covers the collector to trap the radiation from the sun, as well as to insulate it to some extent from the elements.

SDA's Flat Plate Collector of choice is locally manufactured by Powerz-On and carries the SABS mark of approval. The W-range of collectors has been designed for thermosiphon applications and is available for 100-, 150- and 200 litre systems. Two x ST-150 panels are used for the 300 litre system. Powerz-On, a subsidiary of the CSI Group, backs their collector with a 10 year warranty.

An Evacuated Tube Collector consists of glass tubes and a manifold. The evacuated tube is a double walled glass cylinder of which the outer space has been evacuated for insulation to prevent heat loss. Thermal absorbent applied to the inner wall of the tube captures the radiated energy. 3 Layers of coating applied fulfil the following functions:

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The fin is wrapped around a copper heat pipe in the core of the tube. The heat rises to the bulb at the top end of the heat pipe, which slots into the manifold. Water circulating through the heated manifold is thus warmed.

Our primary supplier of Evacuated Tubes is Pacific Solar who imports this from China with a SABS mark of approval and also provides a 10 year warranty. The EVT's are available in 12-, 18- and 24 tube manifolds which can be used in 150-, 200- and 250 litre systems.

Thermosiphon Solar Systems

Our Geyser

A solar geyser differs from a regular electric geyser in that it has two extra ports to allow the water to circulate through the collector, it is better insulated to prevent heat loss and it is fitted with an element with a lower kW. Should there be not enough sunlight to heat the water the thermostat and element can still warm the water for you, provided that there is electricity.

We prefer to use the Solartherm geysers manufactured by WE Geyser in South Africa; with carries the SABS mark of approval and 10 year warranty. The geyser has a pex lining which makes it suitable for all water types, requires no sacrificial anode and has been proven to be 98% thermally efficient.

Why the DB board timer?

In order to qualify for the Eskom rebate, the solar water heater may not draw any electricity during specific "peak" hours published by Eskom from time to time. You also want to give the sun time to warm the water before calling on the electrical back up. The DB board timer achieves this.

What about hail?

The SABS performs stringent tests on all systems to check that hail will not cause extensive damage to it - systems that pass should be able to withstand hail of up to the size of a golf ball.

What happens in freezing conditions?

The water in the copper pipes of a flat plate collector can freeze-up in really cold conditions. The risk is that the expanding water (ice) may cause the system to burst. A dump valve allows the water that is busy freezing to escape from the collector, avoiding damage. Evacuated tube collectors are a lot less prone to freezing as there is no water in the tubes, and the manifold is well insulated. Thermosiphon systems are more vulnerable to freezing than active systems, and it is advisable to rather use an indirect solar water heater if there is a real risk of this happening.

What is an indirect system?

In indirect systems the fluid in the collector circulates in a closed loop through a heat exchanger, which can be situated inside or outside the geyser. The heat exchanger acts like an element and heats the water in the geyser. Glycol (anti-freeze) may be used in the closed loop to improve heat transfer and to prevent freezing. Indirect systems are generally used in areas with poor water quality or with severe freezing problems.