

HOW THE SOLAHART THERMOSIPHON WATER HEATER WORKS

Solar water heaters make use of two natural phenomena for their operation: black objects absorb heat, and hot water rises. It is a simple system, and the only moving part is water.

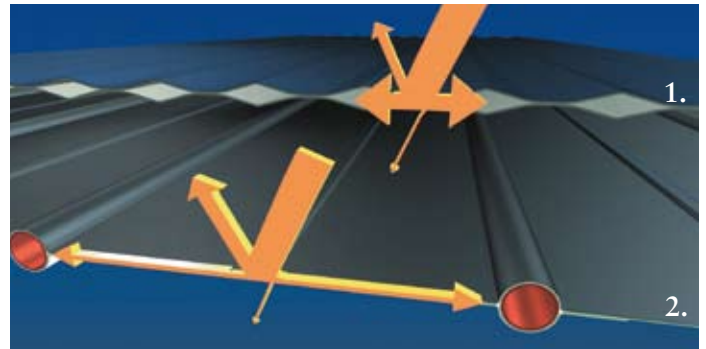
- Selective Surfaces
- The Thermosiphon Principle
- Heat Exchanger Principle
- The Need For A Booster
- Recovery From Cold



Selective Absorber Surfaces

The type of collector installed largely depends on climate and water usage. The simple black painted absorber is efficient for use in areas with high solar gain while a selective surface absorber is used in colder, cloudy climates to compensate for lower levels of solar radiation.

The selective surface absorber goes through a two stage plating process, first with nickel and a final coat of Black Chrome. The performance of Black Chrome is superior due to its improved ability to absorb and retain solar energy. (Fact File 03 describes the function of selective surfaces).



The absorber panels of the Solahart Kf (1.) and L Series (2.) models.

The Direct Thermosiphon Principle

Imagine a solar collector filled with cold water. When the sun warms the absorber surface, the heat is transferred to the water in the collector. The hot water rises in the collector into the tank, where it displaces colder water, which descends to the bottom of the collector. As the sun continually heats the water, this 'circular' path continues. The greater the temperature difference of hot water to the storage tank, the faster the flow. This is known as the 'thermosiphon' effect.

When the sun's heat is no longer present, the thermosiphon effect stops, and hot water is retained in the storage tank, where the high density insulation conserves the heat.

The Solahart L Series models use the direct Thermosiphon principle and systems are used in areas where water quality is good and freezing does not occur. They are recommended where high solar radiation levels occur.



Standard fin and tube absorber design



In an open circuit system such as Solahart's L Series, water circulates through the collectors, is heated by the sun and then stored in the storage cylinder

Suitable for:

- High solar radiation areas
- Medium to good water quality

Not suitable for:

- Frost prone areas
- Harsh water areas

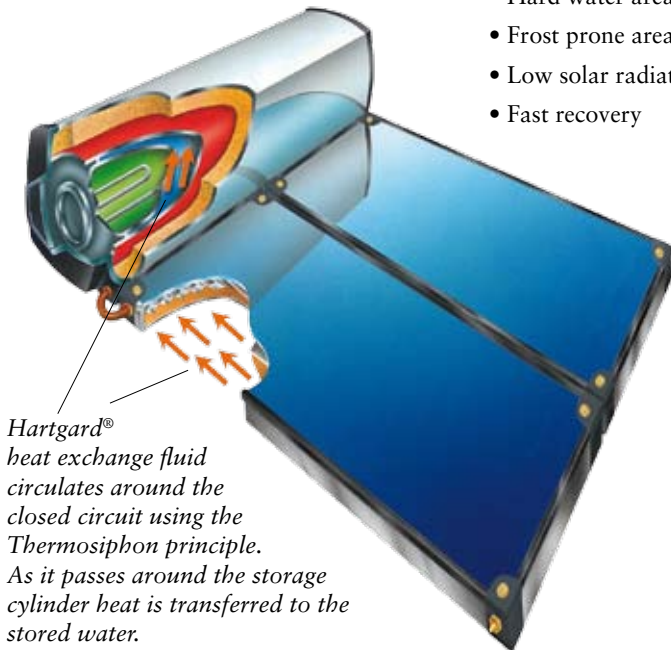
The Heat Exchanger Thermosiphon Principle

In places where freezing temperatures (0°C; 32°F) may occur, a conventional open circuit solar water heater is not suitable due to the expansion of water as it freezes. This will burst the piping within the absorber causing damage which will result in costly replacement not covered by manufacturers warranty. Solahart have developed and patented a unique heat exchanger system known as the 'closed circuit solar water heater' to eliminate the potential damage which is possible due to freezing.

A jacket is located around the complete circumference of the hot water storage tank and this jacket is connected to the absorber.

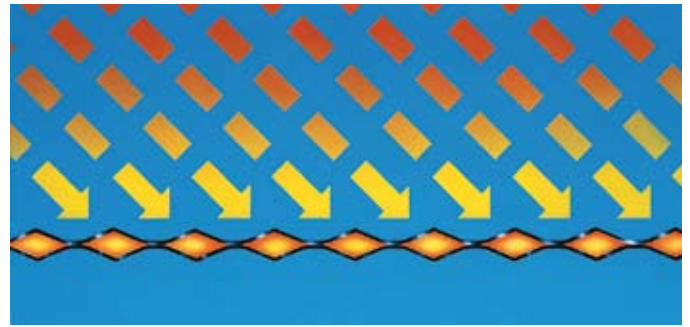
Suitable for:

- Hard water areas
- Frost prone area
- Low solar radiation
- Fast recovery



The same thermosiphon process occurs, but in this case, the sun's heat is transferred to a special fluid in the collector called 'Hartgard®'. The heat is 'exchanged' from the Hartgard, to the water in the tank, from the closed circuit. Solahart always specifies the closed circuit solar hot water system wherever freezing temperatures occur, or the water quality is harsh.

The Solahart J and Kf Series models use an internal heat exchanger to ensure that the potable water supply is isolated from the absorber plates to prevent freezing and clogging.



Solahart's Multiflow® absorber design increases the fluid to surface contact ratio

Solar Hot Water System Boosting

The amount of water heated by the sun varies with climate. But even on cloudy, rainy days, there is still some solar energy being collected by the absorbers.

There are some locations around the world where a solar water heater can provide virtually all the user's needs for hot water without the need for boosting. However, for most users, a booster is required to offset the lack of solar radiation on cold and rainy days.

Solahart thermosiphon systems are available with gas or electric in-tank boosters. A gas in-line booster is also available.

Whichever type of booster is used, a thermostat automatically controls the use of purchased energy. In the case of the gas booster, the ignition is fully automatic. With in-tank boosters, the householder can control boosting with an inexpensive time switch.

Hot Water Recovery

If all the hot water in a Solahart solar water heater is used, it only takes a short time to reheat. The time taken depends on the available solar energy and the type of boosting used. From a temperature of 20°C (68°F) (feeling cold to touch) an in-tank booster will take approximately one hour to generate enough hot water to take a hot shower (at 45°C (113°F)). The in-line gas booster provides hot water instantaneously.

If hot water is used in the early morning, then there is an opportunity for the sun to reheat the water rather than electric or gas boosting. This is less costly and more helpful to the environment.