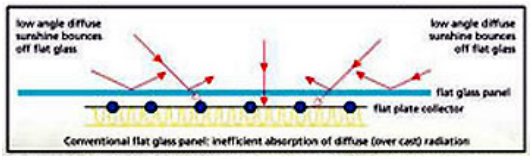
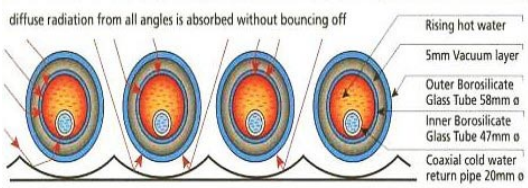
AMERICAN MICROSOLAR Inc.
SOLAR WATER HEATING SYSTEMS

PRODUCT INFORMATION



A LITTLE HISTORY

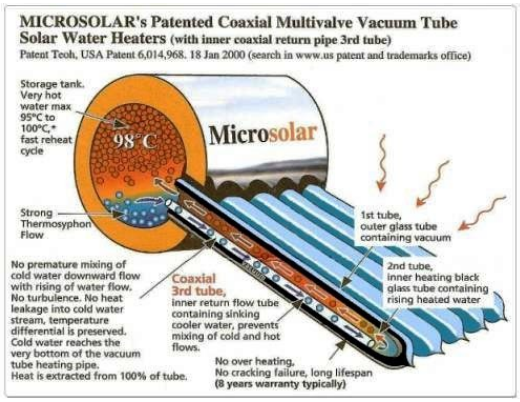
In the past, most solar water heaters were based upon a 1976 Japanese patent which used a flat panel collector to catch the suns rays to heat water, then pump it through pipes to a storage tank. These systems are very inefficient due to the fact that the sun's rays bounced off the flat glass collector on the roof and there was significant heat loss caused when the water was pumped to the remote storage tank. This resulted in the need for electrical backup to keep the water heated, which meant energy used, not energy saved. Vacuum tube technology improved the collection of the sun's rays and made the collectors more efficient, but heat was still lost due to the need to pump the heated water to the remote location.



The Microsolar Water Heating System was designed and developed to correct the inefficiencies of these early models. How did they do it? The Patented Coaxial Multivalve Vacuum Tube system uses a Parabolic reflector beneath the collector tubes to catch the sun's radiation from every possible angle and absorb the maximum, even on cloudy days. Then the hi-tech, spherical storage tank is attached directly above the collector tube assembly so the hot water generated flows directly up into the tank by "Thermosyphon". It uses no electricity, pumps or moving parts.

HOW IT WORKS

Solar water heaters work by the phenomenon of "Thermosyphon" natural convection circulating the hot water in the collector panels into the insulated hot water tank above, (hot water is lighter, so it rises, while cold water is heavier, and therefore it sinks). No pumps or motors are involved. The cold water descends from the bottom of the storage tank to the bottom of the collector panel where it is heated up by solar energy. The water rises up the panel as it heats and returns to the tank where it rises to the top of the tank ready for use. Cold water from the mains supply passes through the tank inside a heat exchange coil located inside the tank. The hot water in the tank transfers this solar generated heat to the water in the coil, resulting in hot water becoming available



EFFICIENT THERMOSYPHON FLOW MEANS MORE HOT WATER FOR YOU

Obviously, in this weak thermosyphon convection flow system (there are no pumps), other factors being equal, the highest water temperatures are achieved by solar water heaters whose thermosyphon circulation paths are the most efficient and offer the least drag, i.e.:

1. Shortest thermosyphon loop, directly from panel to tank, no twists and turns;
2. No bottlenecks, freer flowing through greater number of valves or feeder pipes into tank from panel, no sharing of a common manifold;
3. Minimum or zero horizontal run (hot water wants to go up, and cold water down not horizontally), etc.

An efficient, free-flowing system with minimal drag will start to operate even under cloudy sky conditions, while a system with a high threshold of drag residue (such as a single feeder pipe system) will operate only under sunny conditions or shut down under cloudy skies (you will then have to switch on the electric backup heater). The efficient system will react faster, deliver more hot water per day, working from sunrise to sunset, while the inefficient system is more lethargic; it starts work later and shuts down earlier.

WHY IS MICROSOLAR'S MULTIVALVE DESIGN BETTER?

In Microsolar's Patented Multivalve Technology, each heating tube (20 in all, 25mm diameter) has its own dedicated inlet/outlet valve 25mm diameter directly to the hot water tank. They are not squeezed into a common manifold pipe, and there is no overall constriction of flow diameter, or bottleneck, in the thermosyphon flow.

Microsolar's Multivalve is comparable to 20 lanes on a highway flowing smoothly, while conventional single feeder pipe systems can be compared to 20 traffic lanes squeezed into one single lane – a traffic jam results.

Microsolar also does not have any horizontal flow in its thermosyphon circuit, unlike conventional solar water heaters. All flow is straight up or down following the natural direction of convection flow, no stagnation, no hot spots.

Superior Multiple Direct Injection Actively Injects Hot Water Deep Into The Tank. Microsolar uses the upwelling momentum of 20 streams of hot water from the 20 direct thermosyphon valves to inject hot water deep into the back of the hot water tank all across the length of the tank.

The cold water is thus expelled from the tank actively downwards directly through 20 valves into the bottom of the panel. Conventional single feeder pipe systems cannot do this with only one inlet valve.

The end result of all this research and development is that Microsolar's exclusive technology gives the highest temperatures and the most hot water in the shortest time.

Microsolar's hybrid double glazed panels 47 gals/213 liters 4.4m2 collector will reach 90 °C (measured at showerhead) on clear blue sky sunny days in Kuala Lumpur, Malaysia which has an ambient air temperature 32 °C. This is world record level performance for a solar water heater without pumps, no electricity at all. Most Conventional solar water heaters will not reach above 75 °C.

Microsolar has been awarded (one of four worldwide recipients) the prestigious Time Magazine's "Heroes of the Planet – Design in their 5 April 1999 Time Magazine issue.

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MICROSOLAR SUPERIOR CONSTRUCTION

In addition to a Grade 304 SUS stainless steel tungsten argon gas welded inner water tank, Microsolar is one of the very few solar manufacturers to give the most expensive and the best material available for the outer tank casing and outer panel casing – Nickel Chrome mirror finish stainless steel 304 (Bright Annealed finish) instead of aluminum or colorbond or powder coated steel, or even Fiberglas covers. The high reflectivity of nickel chrome mirror finish stainless steel ensures that the great looking exterior finish will remain throughout the years without fading, tarnishing or cracking. Your Microsolar will still look brand new even after 10 or 15 years.

The high reflectivity casing also prevents undue heat loss from the tank at night due to a very low coefficient of heat radiation, much like the inside of a Thermos flask. This ensures that the water inside stays hot overnight. An optional electrical heating element can be installed for those exceptional days of high demand and consecutive days of poor weather. This allows the optional elimination of an existing hot water storage tank or, this unit can be used in tandem with an existing system.

Modern Multiflow Multivalve Design is Patented By Microsolar Worldwide

MICROSOLAR USE IN LARGER COMMERCIAL APPLICATIONS

When the designer was asked if the Microsolar Water Heating System could duplicate the output of conventional roof solar collectors using pumps (active systems) that circulate the water to a centralized tank, the answer was, "Oh yes, and at less expense."

The active systems are very inefficient. They need solar sensors that stop the circulation pumps whenever the sun disappears behind the clouds. When the sun disappears behind a cloud the collectors cool down but there is a time lag before the sensor shuts off the pump. During this time lag the cooler water will flow into the hot water tank diluting it. When the circulation stops all the hot water in the long pipes to and from the hot water tank to the collectors cool down to ambient in about 15 minutes, releasing a lot of collected heat wastefully into the air. Then when the pump starts again when the sun reappears, the cooled water is pumped into the tank further diluting the hot water. On large projects, the total length of exposed pipe could be hundreds of feet long. That is a lot of water cooling down before it reaches the tank every time the sun disappears behind the clouds.

Microsolar does not suffer any of these problems because the insulated tank is an integral part above the collector and thermosyphon is immediate, cooler water cannot flow up into the tank so there is no mixing and no time lag.

The advantage is **MORE HOT WATER.**