Atlantis Solar Triple Thermal Air Conditioner W/Hot Water Features & Benefits

Atlantis Solar Triple Thermal Solar Air-Conditioner absorbs solar energy from the sun, out side ambient temperatures, and the condenser to heat an environmentally friendly refrigerant, called R410A, from cold liquids to hot vapor, by using vacuum solar collectors. The refrigerant from the compressor goes through a copper coil inside a high density pressurized heated thermal tank, which undertakes a heat exchange. The refrigerant then is heated with 4 methods of heat exchange, in the solar collectors before going through a cycle inside our thermal solar air conditioner; from cooling to heating, and heating to cooling. Our Triple thermal Solar Air Conditioners use a smaller compressor to help process and balance out the vaporizing process before being condensed.

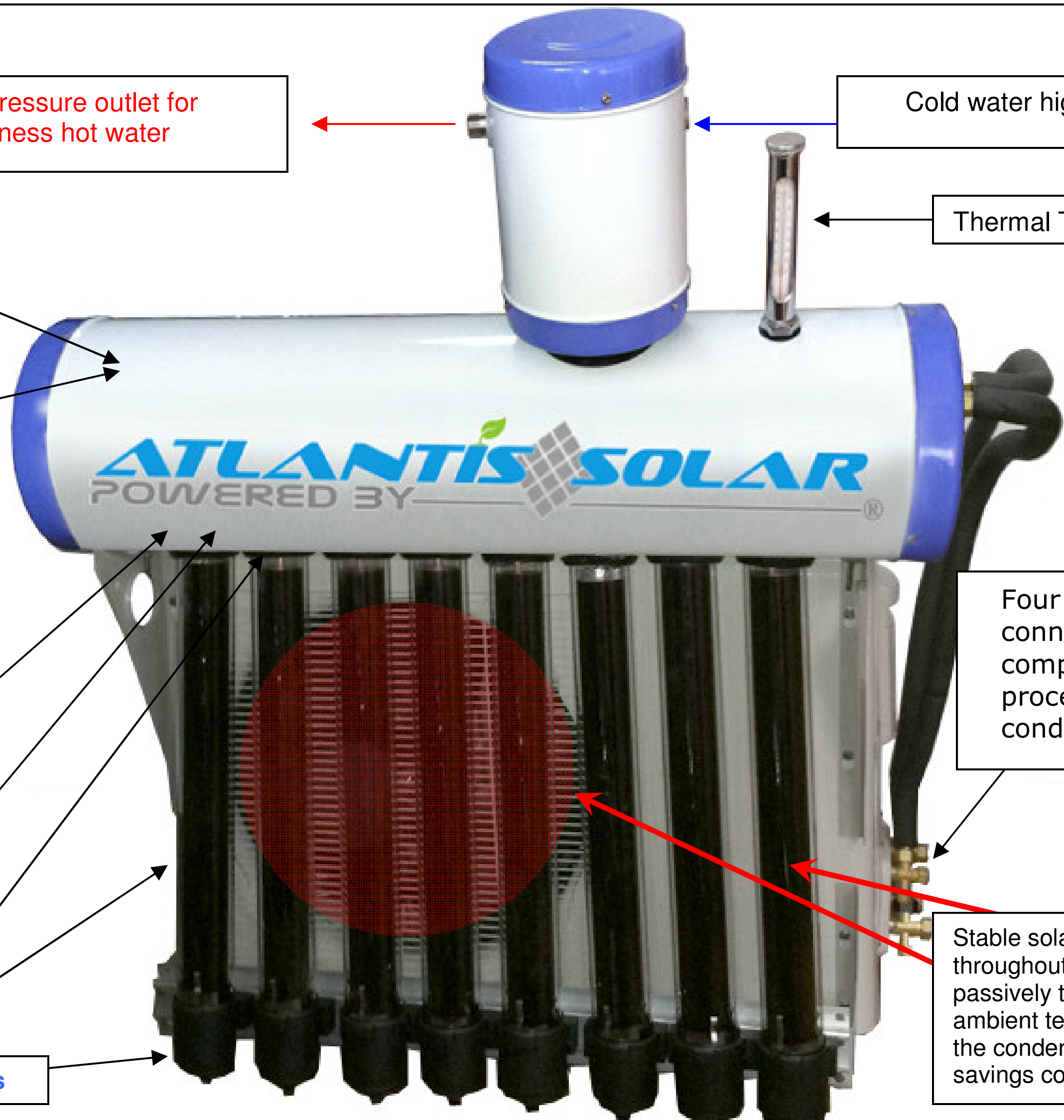
Hot water high pressure outlet for residential / business hot water

Cold water high pressure inlet

Thermal Thermostat 24/7 @ 60° C

5 Year Warranty on Tank

Inner reinforced pressurized water tank for thermal heating. Inner and outside shell are made of SUS316 food grade stainless steel plates, welded by argon arc. Outer coating is a modified-liquid nylon formulation that provides protection to overcome all material limitations and guards metals from wear, salt, corrosion, friction and conductivity. It is a clear fluid base designed to eliminate pinholes and create a void-free impervious barrier that is unattainable by other products.



A thick polyurethane insulation 55mm providing 24 hour heat control.

High-efficiency inner copper coil used as a Heat Exchanger.

Silicon rings to connect and seal the vacuum tubes with an Absorption rate: = 93%, thermal radiation rate: = 6%.

High Pressure Tubes No Water

Easy repair evacuated high quality tubes

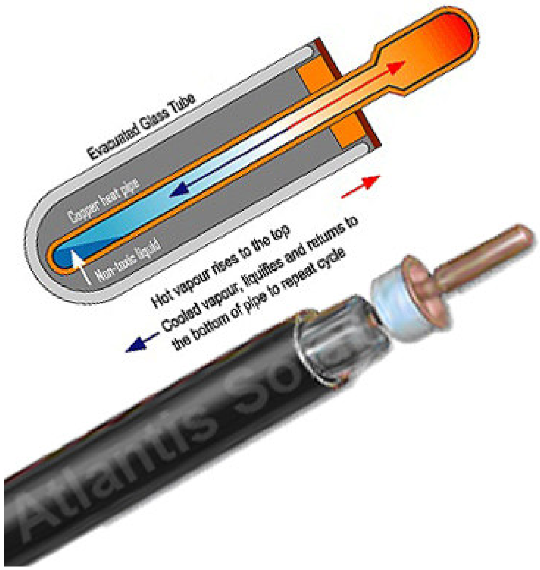
Four copper line connections total, for heat compression, thermal processing, and inside condenser cooling.

Stable solar ambient heat conversion throughout the day and evening (tubes passively track the sun and out side ambient temperatures with help from the condenser). Keeping energy savings consistent 24 hours per day.

Evacuated tube collector

Most (if not all) vacuum tube collectors use heat pipes for their core instead of passing liquid directly through them. Evacuated heat pipe tubes (EHPTs) are composed of multiple evacuated glass tubes each containing an absorber plate fused to a heat pipe. The heat from the hot end of the heat pipes is transferred to the transfer fluid (water or an antifreeze mix—typically propylene glycol) of a domestic hot water or hydronic space heating system in a heat exchanger called a "manifold". The manifold is wrapped in insulation and covered by a sheet metal or plastic case to protect it from the elements.

The vacuum that surrounds the outside of the tube greatly reduces convection and conduction heat loss to the outside, therefore achieving greater efficiency than flat-plate collectors, especially in colder conditions. This advantage is largely lost in warmer climates, except in those cases where very hot water is desirable, for example commercial process water. The high temperatures that can occur may require special system design to avoid or mitigate overheating conditions.



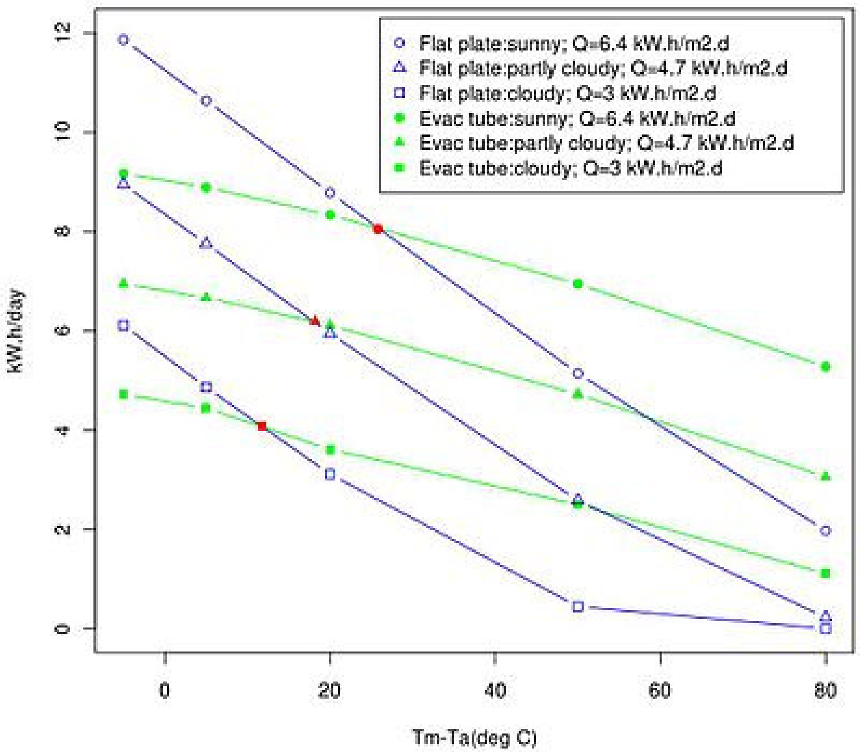
Glass-glass evacuated tube

Some evacuated tubes (glass-metal) are made with one layer of glass that fuses to the heat pipe at the upper end and encloses the heat pipe and absorber in the vacuum. Others (glass-glass) are made with a double layer of glass fused together at one or both ends with a vacuum between the layers (like a vacuum bottle or flask) with the absorber and heat pipe contained at normal atmospheric pressure. Glass-metal tubes allow more light to reach the absorber and protect the absorber and heat pipe (contained in the vacuum) from corrosion even if they are made from dissimilar materials.

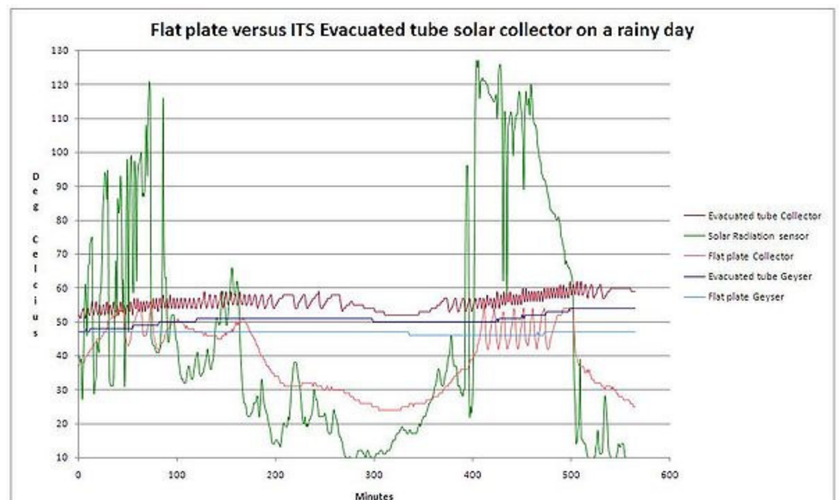
The gaps between the tubes may allow for snow to fall through the collector, minimizing the loss of production in some snowy conditions, though the lack of radiated heat from the tubes can also prevent effective shedding of accumulated snow.

Comparisons of flat plate and evacuated tube collectors

A long standing argument exists between protagonists of these two technologies. Some of this can be related to the physical structure of evacuated tube collectors which have a discontinuous absorbance area. An array of evacuated tubes on a roof has 1) open space between collector tubes and 2) (vacuum-filled) space occupied between the two concentric glass tubes of each collector tube. Consequently, a square meter of roof area covered with evacuated tubes (collector gross area) is larger than the area comprising the actual absorbers (absorber plate area). If evacuated tubes are compared with flat-plate collectors on the basis of area of roof occupied, a different conclusion might be reached than if the areas of absorber were compared. In addition, the way that the ISO 9806 standard[7] specifies the way in which the efficiency of solar thermal collectors should be measured is ambiguous, since these could be measured either in terms of gross area or in terms of absorber area. Unfortunately, power output is not given for thermal collectors as it is for PV panels. This makes it difficult for purchasers and engineers to make informed decisions.



[dubious – discuss]



[dubious – discuss]

A comparison of the energy output (kW.h/day) of a flat plate collector (blue lines; Thermodynamics S42-P[dubious – discuss]; absorber 2.8 m^2) and an evacuated tube collector (green lines; 20EVT[dubious – discuss]; absorber 3.1 m^2. Data obtained from SRCC certification documents on the Internet.[dubious – discuss] Tm-Ta = temperature difference between water in the collector and the ambient temperature. Q = insulation during the measurements. Firstly, as (Tm-Ta) increases the flat plate collector loses efficiency more rapidly than the evac tube collector. This means the flat plate collector is less efficient in producing water higher than 25 degrees C above ambient (i.e. to the right of the red marks on the graph).[dubious – discuss] Secondly, even though the output of both collectors drop off strongly under cloudy conditions (low insulation), the evac tube collector yields significantly more energy under cloudiness than the flat plate collector. Although many factors obstruct the extrapolation from two collectors to two different technologies, above, the basic relationships between their efficiencies remain valid[dubious – discuss].

A field trial illustrating the differences discussed in the figure on the left. A flat plate collector and a similar-sized evacuated tube collector were installed adjacently on a roof, each with a pump, controller and storage tank. Several variables were logged during a day with intermittent rain and cloud. Green line = solar irradiation. The top maroon line indicates the temperature of the evac tube collector for which cycling of the pump is much slower and even stopping for some 30 minutes during the cool parts of the day (irradiation low), indicating a slow rate of heat collection. The temperature of the flat plate collector fell significantly during the day (bottom purple line), but started cycling again later in the day when irradiation increased. The temperature in the water storage tank of the evac tube system (dark blue graph) increased by 8 degrees C during the day while that of the flat plate system (light blue graph) only remained constant. Courtesy ITS-solar.

Flat-plate collectors usually lose more heat to the environment than evacuated tubes and this loss increases with temperature difference. So they are usually inappropriate choice of solar collector for high temperature commercial applications such as process steam production. Evacuated tube collectors have a lower absorber plate area to gross area ratio (typically 60-80% of gross area) compared to flat plates. (In early designs the absorber area only occupied about 50% of the collector panel. However this has changed as the technology has advanced to maximize the absorption area.) Based on absorber plate area, most evacuated tube systems are more efficient per square meter than equivalent flat plate systems. This makes them suitable where roof space is limiting, for example where the number of occupants of a building is higher than the number of square meters of **suitable and available** roof space. In general, per installed square meter, evacuated tubes deliver marginally more energy when the ambient temperature is low (e.g. during winter) or when the sky is overcast for long periods.

For a given absorber area, evacuated tubes can therefore maintain their efficiency over a wide range of ambient temperatures and heating requirements. When employed in arrays, when considered instead on a per square meter basis, the efficient but costly evacuated tube collectors can have a net benefit in winter and also give real advantage in the summer months. They are well suited to cold ambient temperatures and work well in situations of consistently low sunshine, providing heat more consistently than flat plate collectors per square meter.

Besides efficiency, there are other differences. EHPT's work as a thermal one-way valve due to their heat pipes. This also gives them an inherent maximum operating temperature which may be considered a safety feature. They have less aerodynamic drag, which may allow them to be laid onto the roof without being tied down. They can collect thermal radiation from the bottom in addition to the top. Tubes can be replaced individually without shutting down the entire system. There is no condensation or corrosion within the tubes. One hurdle to wider adoption of evacuated tube collectors in some markets is their inability to pass internal thermal shock tests where ISO 9806-2 section 9 class b is a requirement for durability certification.

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