Bhagwat
Energy Pvt. Ltd.

Evacuated Tube Collector Solar Water Heating Systems

High Energy Bills ??? Rising heating costs every year ??? Reduced Profits ??? Do you require heating / pre-heating upto 85 degree celsius ???

IF YES, THEN, USE Bhagwat Energy Pvt Ltd. **Evacuated tube Solar Water Heaters** - an unmatched and reliable solution to conserve energy. The Evacuated Tube Solar Water Heater use the abundant energy of the sun to heat water to temperatures as high as 85C and result in quantum savings in electricity or fuel oil.

The abundantly available, free energy from the sun, can be tapped anywhere the Evacuated Tube Collector Water Heating Systems.

The ETC systems can be easily installed and integrated with existing water heating systems such as a geysers in houses, steam boilers in industries, or pressurized systems in hotels.

What's more, the ETC Water Heating System pay's back your investment in 2-3 years. With an estimated life span of 25 years, this represents excellent value for mone . y

Benefits

- Hot water available round the clock.
- Significant energy savings.
- Non polluting & environmentally benign
- Totally safe & reliable.
- Little maintenance required. No recurring costs
- Easy and soft loan schemes available for any size and type.
- Avail of 100% depreciation in the 1st year itself.
- Operating life of 25 to 30 years.

Applications

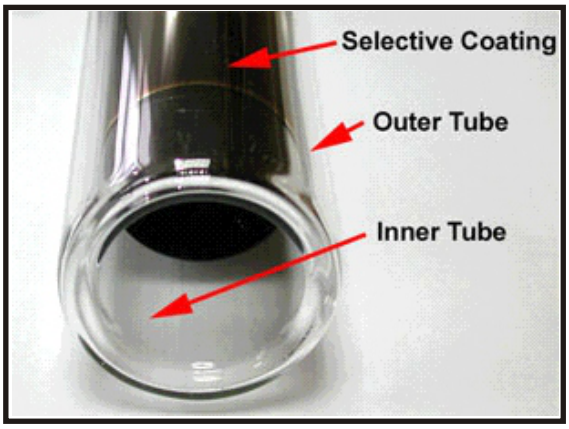
Bunglows, Apartments, Hospitals, Hotels, Canteens, Dairies, Guest Houses, Health Clinics, Laundries, Boiler Feed, Process Requirements, Plating Industries, and all other hot water applications

How does it work ?

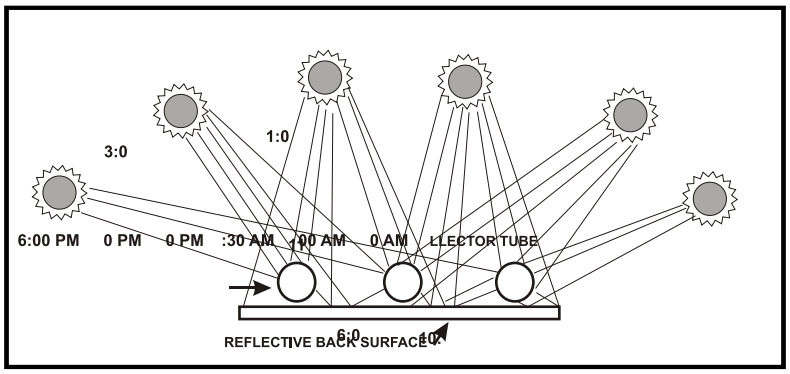
A solar water heating system consists of a suitable collector and an insulated hot water storage tank.

Solar Water heating systems work on the principle of ***'Thermo-Syphon'***. Hot water, lighter than cold water, heats up and rises in the collector naturally to the hot water storage tank. For larger systems the hot water may be ***'force circulated'*** between the collector and the hot water tank.

All glass vacuum tubes is the key component of the evacuated tube collector. Each evacuated tube consists of a 'tube-in-a-tube'. The outer tube is made of extremely strong transparent borosilicate glass that is able to resist impact from hail up to 25mm in diameter. The inner tube is also made of borosilicate glass and coated with a special selective coating. The coating has excellent solar heat absorption and minimal heat reflection properties. Vacuum between the concentric tubes eliminates conductive and convective heat losses from the inner to the outer tube.



▲*Typical ETC construction*



▲*Round shape ensures maximum absorption*

Due to the round shape of the evacuated tube, the amount of solar radiation striking the collector is relatively constant from mid morning to mid afternoon. As the sun rays are incident on the tubes at right angle, reflection is reduced. A reflective back plate reflects back any light that passes between the tubes or reflects off the tubes. by the reflective back panel. radiation is therefore maximized.

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Comparison between ETC & Flat Plate Water Heating Systems

FEATURES	ETC SOLAR WATER HEATER	CU-CU FLAT PLATE SOLAR WATER HEATER
Sun tracking feature	Full 360 deg. usage of absorber area enables 94% auto sun-tracking efficiency allowing maximum solar radiation input throughout the day.	Design does not provide for it. Maximum input only at 12:00 noon
Effect of external weather & ambient temperature	Independent of ambient temperature ideal even during winter / cold weather conditions.	Design dependent on ambient temperature hence low temperature during cold /winter
Effect of hard water	Non-metallic glass pipes with widest absorber diameter (37mm) prevent choking & blocking of water flow and ensures maximum efficiency and life of the system. Glass absorber pipes can be manually cleaned.	Life and efficiency of the system drastically gets reduced over a period of time as scaling sets in and chokes the metallic absorber pipes (small dia. of 12 mm) which requires costly cleaning and maintenance.
Startup time and heating time	Low start-up time from cold to hot in just 2 to 3 hours.	Delayed heating process from cold to hot take more than 5 hours.
Internal connections between collector and storage tank	Integrated design, completely eliminates inter-connectivity	Use of interconnection pipes results in heat loss.

Evacuated Tube Technical Specifications

Structure	All glass concentric dual tube geometry
Glass Material	Borosilicate Glass conforming to ISO 3585
Outer Tube Diameter	47 mm (+/-) 0.7 mm
Inner Tube Diameter	37 mm (+/-) 0.7 mm
Tube Length	1500 mm (+/-) 5.0 mm
Absorber Coating	Outer side of inner tube coated with four-layer cermets selective coatings magnetron sputtering vacuum sashing. a > 93%, e < 6%
Vacuum	Space between outer and inner tube is under vacuum < 5 x 10^{3} Pa
Stagnation Temperature (Air)	< 200 deg. C

01/2006 Specifications subject to change without notice

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JAS-ANZ ISO 9001:2000 Cert. No. 4069