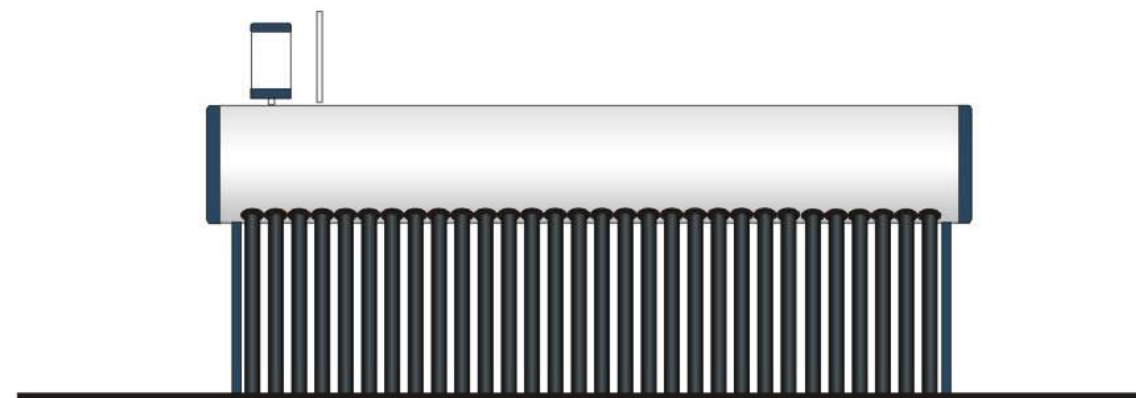




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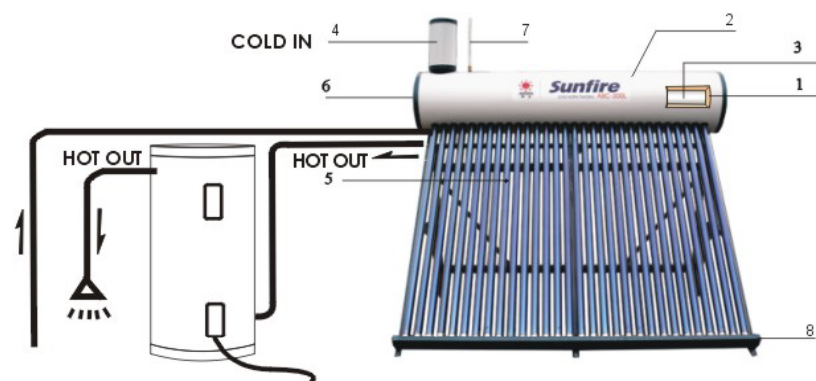
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shentai solar energy

INTRODUCTION

Sunfire solar water heater works simply on sunlight and your local water pressure. There is no electrical energy needed to make it function. The solar water heaters save energy by preheating water to the conventional heater. It usually designed to meet 60% to 90% of the water-heating load. A back-up, conventional heater is still needed to meet 100% of the peak hot water demand for cloudy days or for when the solar system is down for service. The solar water heater is classified as INDIRECT type of solar water heater system. It collects solar energy and heats water, which is served as heat transfer fluid in the tank, and then transfers heat to potable water via a heat exchanger. The construction of the solar water heater will provide you with years of energy-saving, trouble-free operation.



This installation manual is intended to provide the requirements, recommendations, and guidelines necessary to achieve a fast installation and years of trouble-free system operation. There are some ways to plumb the solar water heater, but only the methods included in this manual are endorsed by the manufacturer.

1. Preservation layer
2. Out tank
3. Inner tank
4. Assistant tank
5. Evacuated tube
6. Water tank cover
7. Air vent tube
8. Bottom support

SPECIFICATION

DAC-300L

Model: DAC30-1.9M
 Tank Inner Material: SUS 304-2B
 Tank Outer Material: porcelain steel
 Heat Exchange: Copper Coil
 Glass Tube Material: Borosilicate Glass
 Insulation (back and side): Polyurethane
 Diameter of Glass Tube: 2.3 inch
 Length of Glass Tube: 2 ft
 No. of Glass Tube: 30
 Gross Area: 50 ft²
 Manifold Tank Capacity: 80 Gallon
 Collector Dry Weight: 427 lbs
 Collector Filled Weight: 1087 lbs
 Operating Pressure: 80 PSIG
 Operating Temperature: -13 F/194 F
 Absorptivity: >93%
 Emissivity: <6% (158 F)
 Hailstone Resistance: 1 inch
 Preservation: 80 h
 Life Time: >15 years

CHARACTERISTICS

Shentai solar water heater is designed to efficiently collect solar radiation and to Convert it into usable heat energy for household hot water usage. Do not use it for Heating or storing anything except **POTABLE** water. Shentai solar water heater has no moving parts and operates on local water pressure And solar radiation. There are no pumps or controls to maintain and no electrical Energy is required to make it function. Once the system has been set up, it will Operate at the flow rates that are normal to the household. The evacuated glass tubes of the unit absorbs solar radiation through its highly Effective coating surface and raises the temperature of the water stored in the tank, Serving as heat transfer fluid. Water flows through the cold water supply line into the input of the unit and is heated by the way of heat exchange.

PRE-INSTALLATION CHECK LIST

Check local codes for plumbing and roof load requirements. Installations must meet all local code requirements for penetrating structural members and fire rated assemblies. Obtain all applicable permits.

Properly plan the installation and discuss the proposed location of the collector with the homeowner to avoid any possible conflicts.

Make sure you have all necessary materials at the job site before starting the installation. Proper planning reduces labor and material costs.

INSTALLATION PRECAUTIONS

The following are important measures to follow to ensure a safe, trouble-free installation. Keep the evacuated tubes wrapped because even early morning sun can quickly heat up the tubes. It is most important that the collector should be covered before and while being filled. It is recommended that the evacuated tubes be filled with cold water during the assembly of the collector. Failure to follow these instructions will void the warranty and could damage the collector.

The collector should stagnate wet during times of non-use, except during severe winter conditions where temperatures are below -10°F . Under these conditions the collector and the solar loop piping should be drained.

Remember, the collector can easily produce 180°F to 200°F water during clear, sunny weather.

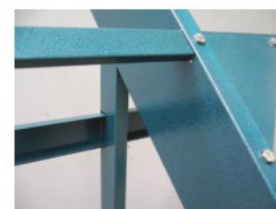
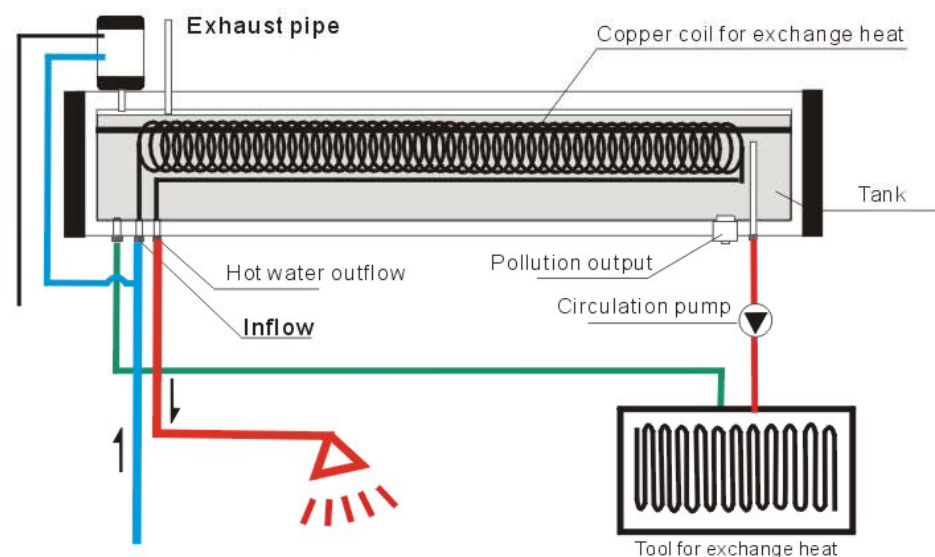
COLLECTOR ORIENTATION

The installation site of the collector should be chosen so the collector receives maximum Solar exposure. It should never receive more than 10% shade on the collector absorption Surface between 10:00 a.m. and 3:00 p.m. The location should be as close as possible to The conventional water heater to minimize the piping run, which should not exceed 100 feet.

For optimum performance in the northern hemisphere, the collector should face due south. Slightly decreased but good performance can be expected from a collector facing within 45° C of due south. In the southern hemisphere the opposite direction, due north, is faced for optimum performance.

The collector tilted to local latitude in sunbelt areas will produce the best overall performance. Increasing the tilt 10° to 15° in the sunbelt will improve winter performance and decreasing the tilt 10° to 15° will improve summer performance. In areas above the sunbelt, the tilt for best year round performance is latitude plus 10° to 15° . These parameters are valid in both northern and southern hemispheres.

Structure Picture for Frame Installation



ASSEMBLY OF THE SOLAR COLLECTOR



1. Put one top of evacuated tube in dust ring.



2. Smear lubrication on the top of tube such as washing-up liquid.



3. Insert evacuated tubes into holes of water tank by revolving form.



4. Then put the other top of tube into the hole of under bottom support.



5. Cover up the dust ring carefully.



6. Now, you finished the installation.



I.Assembly of Supporting Frame

- 1.3 sets of leg assembly are connected by 3 cross bars.
- 2.Level the frame assembly by setting it on 6 pieces of 12"x 12" concrete piers.
- 3.Secure all bolts and nuts
- 4.Carefully position the manifold water tank on the top of the frame and secure 4 bolts and nuts at the bottom of the tank.

II.Assembly of Solar Collector

- 1.Install water level tank on top of the manifold water tank.
- 2.Pipe work is performed by connecting cold water supply to cold water input at manifold water tank, and connecting hot water outlet at manifold water tank to water level tank connected at the top of the manifold water tank as well as the conventional water heater at a house.
- 3.Install air vent tube after the manifold tank is filled with water.
- 4.Wear a seal ring on the top of an evacuated tube.
- 5.Fill the evacuated tubes with water and lubricate the top of evacuated tubes with fluid detergent.
- 6.Smoothly insert the tube into the hole of the manifold water tank by revolving clockwise.
- 7.As long as the tube gets inside the tank, lightly pull down the bottom of the tube into the plastic bottom retainer by revolving clockwise.
- 8.Carefully cover up the seal ring.
- 9.Now, you finish the assembly work.

IMPORTANCE: DON'T EXPOSE THE EMPTY EVACUATED TUBES TO THE SUN DURING THE ASSEMBLY.

GROUND MOUNTS

A ground mount must have a stable, permanent foundation. A concrete HVAC pad or six standard concrete piers embedded at least halfway in the ground are the recommended foundations. Be sure to coat the threaded end of the bolts that secure the collector base mounts with silicone caulk to prevent rust.

The lower edge of the collector should be at least one foot above the ground so it will not be obstructed by vegetation or partially submerged in standing water. Collectors mounted at ground level can be more susceptible to damage (flying rocks from lawnmowers, etc.) or vandalism. The placing of an expanded metal mesh screen in front of the glass tubes may be helpful in preventing breakage.

A boiler drain must be installed in all ground mounts at the collector inlet. A boiler drain or a vacuum breaker must be installed at the collector outlet. Buried piping must be properly insulated and non-degradable. In areas where severe freezing occurs, all underground piping must be below the frost line and insulated with minimum 1- 1/2" wall insulation.

SYSTEM PLUMBING

All piping must meet local code requirements for potable hot water service and must be installed to slope 1/4" per foot of pipe run to insure proper drainage under shut down conditions. Typically, piping must be 1/2" or 3/4" diameter type "L" or "M" copper tubing g sweated with 95/5 or 60/40 lead free solder. Soft copper tubing is recommended because of its ability to expand during mild freezing conditions. Never use PVC or CPVC Piping for the solar loop. The total length piping from the collector to the conventional water heater should not exceed 100 feet; the longer the pipe run, the greater the heat loss. If a greater length is necessary, an increase in piping diameter may be required.

Pre-heater systems plumbed to a conventional gas water heater must have a tempering valve installed in the return line of the solar loop piping. Set the valve between 120°F And 145°F. Systems that pre-heat conventional electric water heaters can have a tempering valve installed (as an option) in the hot water supply piping to the house. Set the valve Between 120°F and 145°F. The chart below illustrates exposure times at various water Temperatures that can result in serious injury.

THIRD DEGREE BURN CHART

Temperature (F)	Time (Adults)	Time (Kids or Adults over 65)
9.5 min.		
2.0 min.		
130	30 secs.	10 secs.
135	15 secs.	4 secs.
140	5 secs.	1.0 secs.
145	2.5 secs.	
149		0.5 secs.
150	1.8 secs.	
158	1.0 secs.	

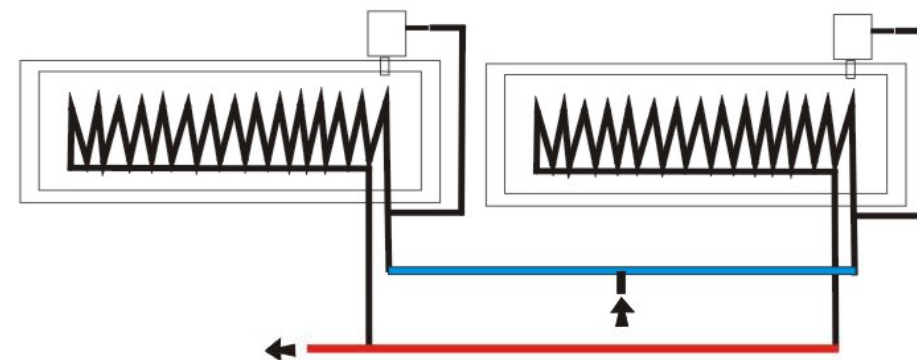
All systems must have a 150 psi pressure relief valve installed in the solar loop piping between the collector and the flow control valve. The valve may be installed in the supply side of the solar loop piping, the return side of the solar loop piping, or at the collector on either the inlet or the outlet pipe connection.

TWO OR MORE COLLECTOR SYSTEMS

Households with more than six members or with a large hot water demand should consider having a two units system. Light commercial applications such as restaurants, car washes, housing with central hot water systems, swimming pool bath houses, and process hot water can be served with multiple collector systems.

Two unit systems must be plumbed together in parallel to ensure that both collectors drain properly. The piping flow paths must be of equal length so each collector receives equal flow pressure. Make sure all piping slopes 1/4" per foot so the collectors and all piping drain completely.

As shown in drawing, the Recommended Configuration has both units installed in the normal horizontal position with the inlet/outlet pipe nipples on the right hand side of the collector. This configuration has a considerable length of piping exposed. Be sure to insulate this piping well and to run it as close to the collectors as possible to limit any possible negative aesthetics. If the collectors are tilted up, the piping can run behind them, making a much cleaner looking installation.



Connect with two solar water heaters

The Alternative Configuration has improved aesthetics by "shentai" the second collector around so the pipe nipples are on the left hand side of the collector facing the pipe nipples of the first collector which is installed in the normal horizontal position. The inlet on the second collector now becomes the outlet and the outlet becomes the inlet. This configuration is acceptable but there are three factors that could affect performance. In-house testing has shown that a flipped collector will have slightly reduced performance, some air entrapment and will only partially drain. The contractor will have to decide the requirements of each installation when choosing which configuration to use.

SYSTEM INSULATION

All piping, fittings, valves, and the conventional water heater must be well insulated. Even small sections of bare pipe will cause substantial heat loss at elevated temperatures. The cold water supply line will also conduct heat away from the system unless it is insulated. Use a $\frac{3}{4}$ " wall, closed-cell tube insulation such as Rubatex, Armaflex, or Insultube in mild climates. In cold climates, where freezing occurs, 1.5" wall insulation must be used. All tube insulation exposed to sunlight must be protected from UV degradation. Use pipe insulation jackets or a coating of exterior grade latex paint, or metal tape. Do not use duct tape because it will quickly deteriorate when exposed to outdoor conditions.

FREEZE PREVENTION

Shentai collector is virtually freeze proof. However, the pipes leading to and from the collector can freeze. Collector piping should be as short as possible and should penetrate the building as close to the conventional water heater as possible to minimize exposed runs of piping. Exposed piping or piping in unheated spaces must be insulated with a minimum of 1 $\frac{1}{2}$ " wall insulation. It is extremely important that all piping be installed to slope a minimum of $\frac{1}{4}$ " per foot of pipe run to ensure proper draining during severe cold weather. The following table is a guide to the hours required to freeze solid $\frac{3}{4}$ " type M and type L copper pipe that has been wrapped with Armaflex/Rubatex pipe insulation of various thickness.

Because contractors have greater knowledge and experience of their local winter weather patterns and conditions, it is their responsibility to decide if a freeze prevention valve or heat tape is necessary for the system.

In northern climates, the collector should be shut down by draining during any months that average or exceed 1,000 heating degree days. The collector should also be drained whenever severe freezing conditions exist, below 10°F with overcast skies. Good performance can be expected from during daytime conditions of clear skies and cold ambient temperatures. It is most important for local contractors to realize it is their responsibility to use the most appropriate and reliable techniques necessary for their area to prevent freeze damage to their customer's piping or collector.

UTILIZATION

Shentai solar water heater is designed as self-contained unit that acts as a solar collector and heat fluidwater storage tank integrated into one piece of equipment. In most cases, it is utilized as a pre-heater to a conventional water heater.

Sunfire solar water heater is designed to operate automatically. However, as with all solar water heaters, the total amount of solar contribution by this one is dependent upon the hot water consumption pattern of the household, daily weather conditions, and variable amounts of available sunlight throughout the year. Energy saving will vary from month to month, but it is possible to maximize these savings by scheduling large hot water usage, such as clothes and dishwashing, for the early afternoon.

The simple design and quality construction of the Sunfire solar water heater will ensure a reliable service life of fifteen years or more. This manual details the essential operation of the unit and is intended to illustrate proper installation techniques. To ensure trouble-free operation, all installation work should be performed by qualified licensed contractors and in accordance with all local codes.

TROUBLESHOOTING AND ROUTINE MAINTENANCE

You can correct most problems by yourself.

PROBLEM	CAUSE	ACTION
No hot water even if sunny day	1. Collector surface is covered by such as snow and dust, or something is shading the collector surface 2. Piping problem.	1. Remove all blockers and clean the collector surface. 2. Call for technical help.
Manifold tank leakage	1. Rubber sealing ring broken. 2. Installed improperly.	Call for technical help
No water supply during extremely cold weather	1. Freezing. 2. Pipe leaking	Call for technical help



Sunfire solar water heater is virtually maintenance free. However, from time to time, the glazing of the collector may need to be cleaned. The best time to clean the glass is early morning before the collector gets too hot. Use a household glass cleaner and soft Cloth.

If the homeowner cannot get water to flow from the hot water lines, the problem is probably with the local water source and not the system. Check the cold water supply.

If the solar water heater is to be unused for a long period of time during warm weather, it is best to leave it to run. However, if unused for long periods of time during winter months in freezing climates, it is best to drain the collector and the solar loop piping.

LIMITED THREE YEAR CONSUMER WARRANTY

Warranty

Sunfire Solar Energy LLC warrants this Sunfire solar water heater and accessories against defects in material or workmanship as follows:

1. LABOR: If this product is determined to be defective within Three (3) Years of the date of purchase, Sunfire Solar Energy LLC will repair or replace it at no charge. Sunfire Solar Energy LLC reserves the option to be responsible for all labor charges.
2. PARTS: Sunfire Solar Energy LLC will supply new or rebuilt replacement parts in exchange for defective parts for a period of Three (3) Year after the date of purchase. The customer will be responsible for the cost of parts after the warranty period expires.

Warranty Service

Proof of purchase in the form of a bill of sale or receipted invoice that is evidence that the unit is within the warranty period must be presented to obtain warranty service. Call Service Department at 202-236-4188 for warranty service.

Limitations

This warranty does not apply to:

Conditions resulting from failure to provide reasonable and necessary maintenance in accordance with the Owners Manual.

Conditions resulting from any misuse, abuse, negligence, disassemble, or alteration.

Conditions that is caused by operating the Product with any fluid other than water.