



UVT

VacTubes Solar Systems



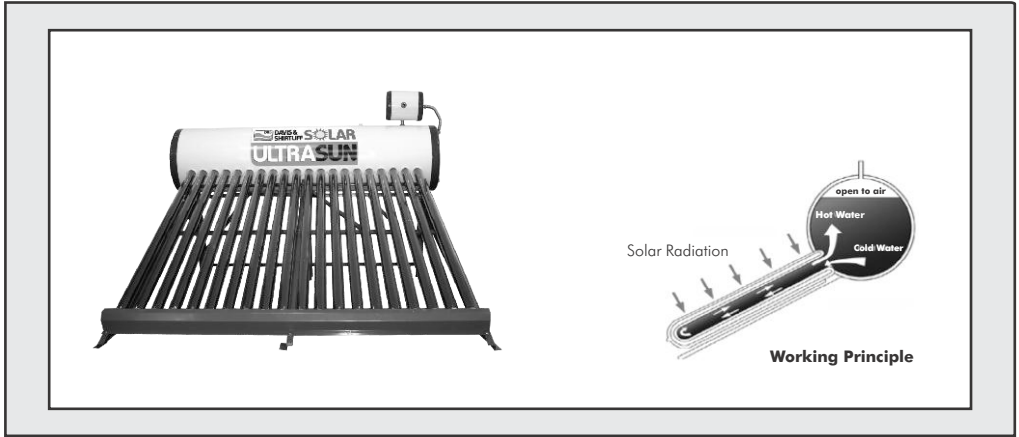
Installation & Operating Manual

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Congratulations on selecting a Ultrasun UVT Vactube Solar Hot Water System. They are manufactured to the highest standards and if installed and operated correctly will give many years of efficient and trouble free service. Careful reading of this Installation Manual is therefore important, though should there be any queries they should be referred to the equipment supplier.

1. SOLAR WATER HEATER SPECIFICATIONS



Ultrasun UVT VacTube Vacuum Tube solar hot water systems are the most efficient water heating systems available. Solar energy is captured in the vacuum sealed glass void heating the water in the glass tube. The heated water rises to the top of the pipe and collects in the tank. The large surface area of the vacuum tube and high water turbulence within the internal chamber provide rapid transfer of heat to the water flowing through the tank. The sealed evacuated tubes and tri-oxide coating provide maximum solar gain even in the coldest areas and during cloudy or overcast days. System features include;

- Individual high efficiency concentric tube and glass heating elements
- Storage tank comprising a stainless steel inner cylinder, plastic painted insulated galvanised external casing and 1.5kW heating element
- Separate 8L cold water header tank
- Anodised aluminum frame
- Flat roof mounting kit
- Supplied with 4 extra glass tubes

Due to the limited pressure capacity of vacuum tubes supply must be via the included header tank and systems must not be connected directly to the main supply.

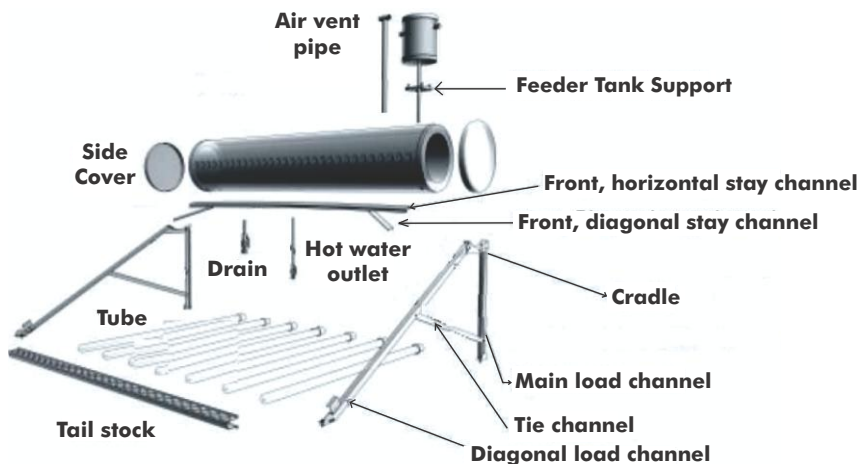
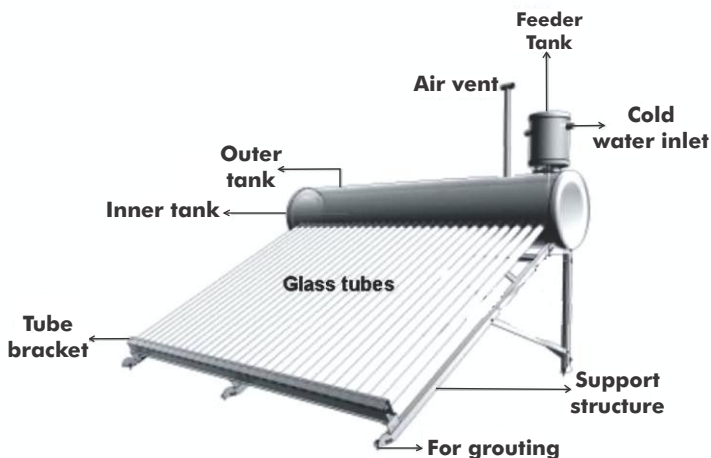
SPECIFICATIONS

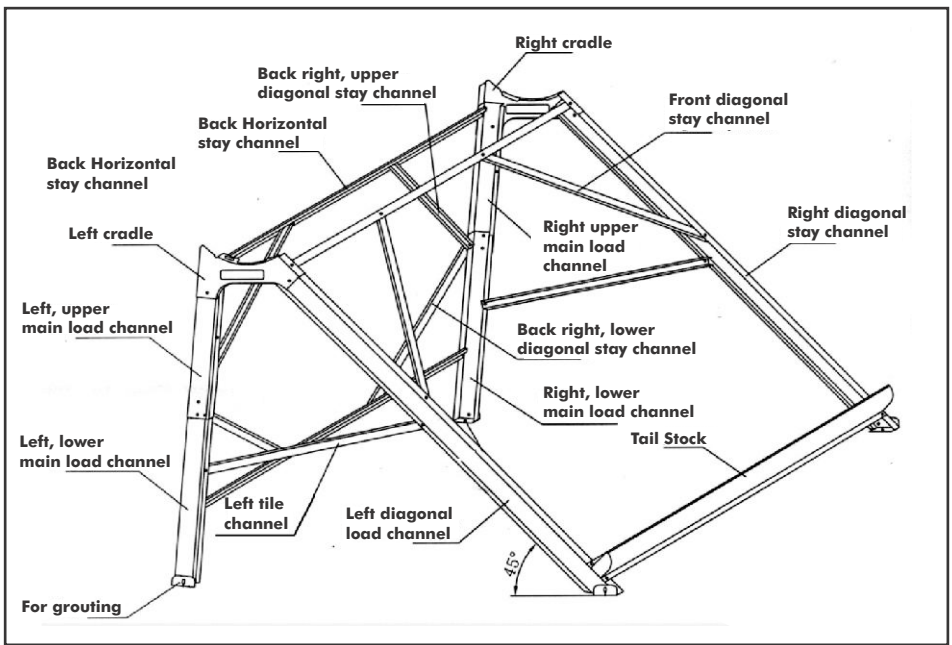
Capacity: Hot water 200litres, Cold water 8litres

Vacuum tubes: 20pieces

Absorber Area: 3.28m^2

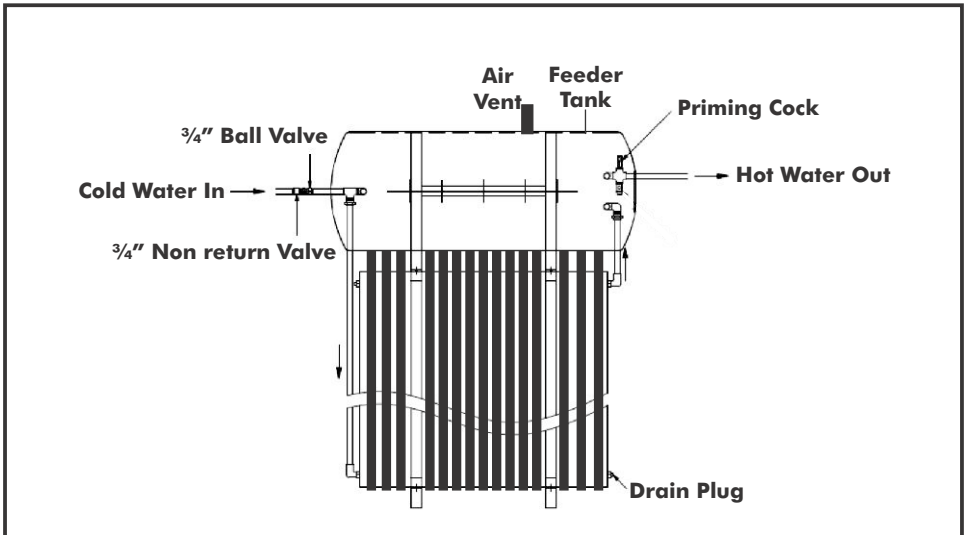
STRUCTURE





2. EQUIPMENT SPECIFICATIONS

The equipment supplied comprises of two principal components, the tank and the glass tubes which are mounted together on a frame. A schematic layout of the circulation arrangement is shown below:-



3. SYMBOLS AND WARNINGS



The installation of the solar system must be in accordance with the relevant requirements of the local authority building regulations as well as regulations for the prevention of accidents when carrying out works such as solar installation. It is necessary to do so in a safe and professional manner, taking due care of any aspects of the works that could result in injuries to the person, buildings as well as general public.



Work should be preceded by a risk assessment covering all aspects of health and safety risks, or training requirements that are reasonably foreseen.



Installers must adhere to the valid work protection regulations, in particular when working on the roof. Anti-fall protection must be employed whenever there is a risk of falling.



To avoid the risk of being burned or scalded by hot components, Installation and replacement of collectors or parts should be done on cloudy days. Installation work on sunny days should be carried out only in the morning or evening or with the collector covered.



Place the evacuated glass tube collector out of reach of children.



If there is risk of hailstorms additional protection should be provided to the evacuated glass tubes by means of a mesh.



The glass tube should not be touched or filled with cold water if tube has been exposed to sun without water.



Immersion heater is intended as standby device for water heating and should not be used simultaneously.



It is recommended to use a spanner to fix the pipe from the tank when making any connections.



Prevent twisting and axial force to the pipe to avoid damage to the seal.



Hard objects should not be dropped on glass tubes.



Blockage or damage to the vent pipe can create severe damage to the solar water heater. Should this occur, call the authorized service provider immediately. In case of emergency, like breakage of tubes or leakage in tank. Close the cold water inlet and hot water outlet valves immediately and call authorized service provider for rectification of problem.



Do not connect any pressure relief device to the vent pipe of this solar water heater.

4. SITING

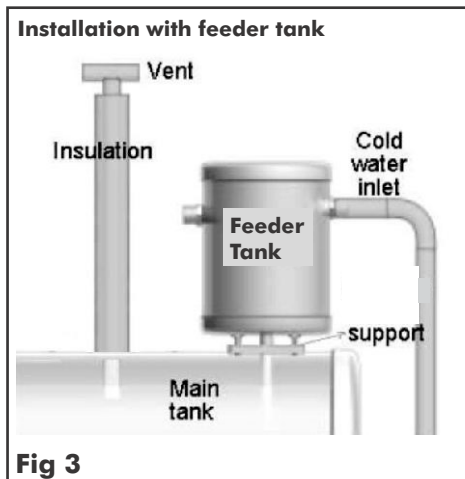
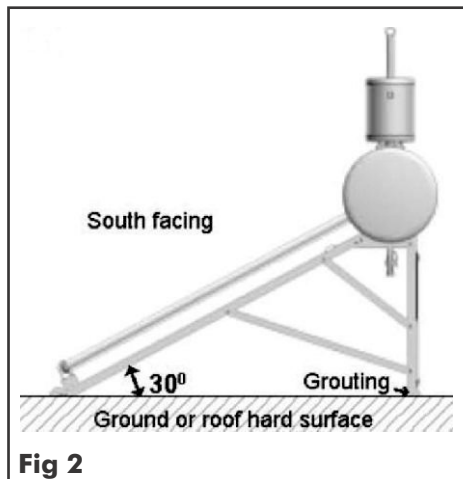
Correct siting is critical for the effective operating of a solar water heater, the following being important guidelines:-

- Orientate the principal axis of the units in a North/South direction, with the collector facing the equator. This orientation is important to maximise sun exposure on the collector as it tracks on its East /West axis throughout the day.
- Tilt at approx 15° . In order to optimise irradiation. Heater units should never be laid flat.
- Avoid any shade, especially between 10am and 4pm. Shade reduces system efficiency.

Preferably, solar water heaters should be installed on roofs where solar irradiation is highest and they are also less exposed to damage. If this is not possible, a protected ground sitting is acceptable.

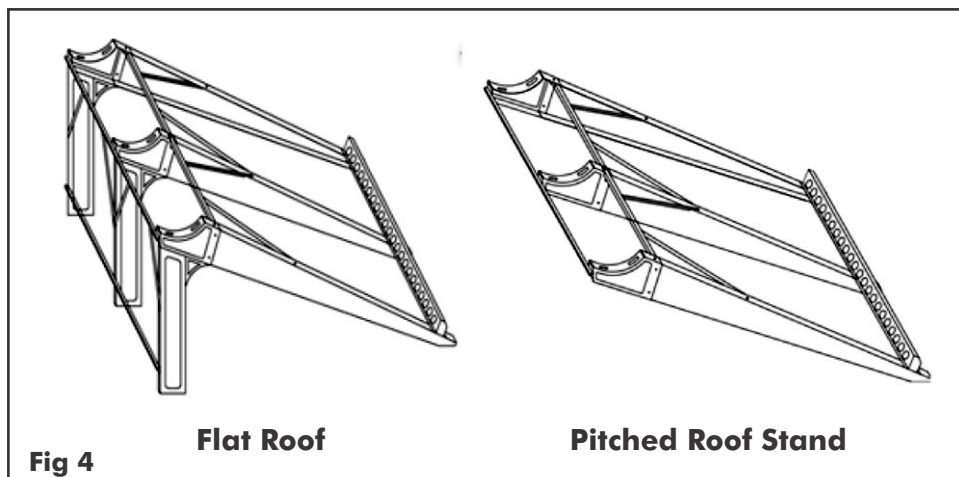
5. INSTALLATION

1. The location of the solar water heater should be on even surface with plenty of sunlight and free of shadows between at least 9 am to 4 pm. For installation North of the Equator it should be installed facing South and vice versa for installation South of the Equator.



2. Wherever wind speed is high, the solar water heater should be grouted properly to the roof of the building. A lightning conductor may be fitted if required.

The frame supplied with the Solar Tank is a dual-purpose frame that can be used either on a flat roof or on a pitched roof, depending on the assembly adopted. (See Fig 4)





Working on roof areas is dangerous – particularly in the case of pitched roofs.

- Ensure that the roof structure is strong enough to take the weight of the filled tank.
 - Care should be taken when maneuvering the stand. It is preferably done by two or more people.
 - It is advised that the installer stands over the main roof support structure.
 - Extra care should be taken when mounting and dismounting iron ladders.
3. Fix the stand securely on the roof, ensuring that any fixings used that penetrate the roof outer surface are fully sealed on completion of the job. Set the tank in its cradle and secure loosely to the frame with the bolts provided.
4. The filling point on top of the tank should be at the top as it sits on the frame so that when the Feeder Tank is in position it stands vertical - this is important because of the operation of the control valve within the feeder tank

At this point of the installation, it may be necessary to adjust the set of the frame, in order to ensure that the tanks are correctly positioned. This may include fitting a spacer to the front or back mounting points.

Installing the Feeder Tank

Prior to installing the Feeder Tank, ball valve should be checked to ensure proper. Every Feeder Tank assembly is individually tested before leaving the factory, however, vibration in transit sometime causes the valve to dislodge or jam.



The ball valve is intended for use with a supply pressure of no more than 4 bars.

5. Install the Feeder Tank on top of the Main Tank.

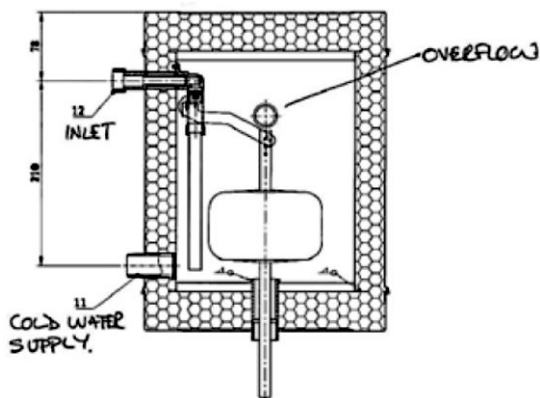


Fig 5 Cross section of standard Feeder Tank showing pipe positions

The Feeder Tank is secured onto its base simply by screwing it onto the inlet port on top of the Main Tank. This is a standard $\frac{3}{4}$ " BSP pipe-fitting and the tank should be screwed into position using PTFE (thread) tape.

The final position of the Feeder Tank is correct when the 'inlet' is facing the end of the Main Tank that it is closest to.

6. Connect the hot water outlet port after the valve with insulated pipeline to the usage points. It is advised to use either polyethylene-laminated aluminum pipe or CPVC (N 20 Grade) for the hot water pipe.

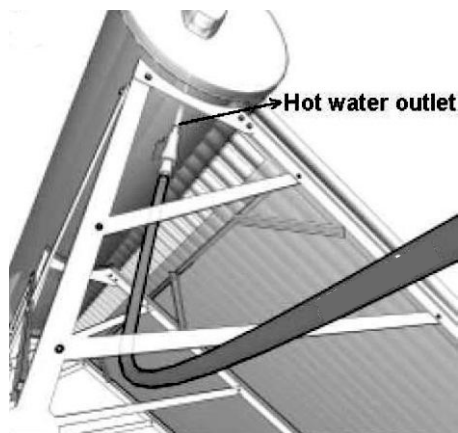


Fig 6

7. It is advisable to use compression plumbing pipes which can be installed without tools for cold and hot water usage for ease of installation and maintenance. They provide better insulation than manually-insulated metal pipes, and need no insulation of the hot water plumbing if pipe does not exceed 12 meters. Pipe wrench use is also unnecessary.
8. The distance between points of use and the solar water heater should be minimized as much as possible, the maximum recommended distance without heat loss is 12 meters using recommended pipes. For longer distances proper insulating material should be used to prevent heat loss.
9. Using a spanner, grip the nipple firmly while tightening inlet/outlet pipes to tank. This is necessary to prevent nipple weld breaking.



Fig 7

10. To reduce heat loss in the pipelines, 3-4 outlet points are recommended. In case the outlets exceed this or the water line is long, it is recommended to expand the capacity of the solar water heater. The standard diameter of inlet/outlet points of the solar water heater 1/2".
11. In places where the hot and cold water pressure is not equal and mixing valves are used at the usage point, care should be taken to install either non-return valve (NRV) based mixer or a NRV on the hot water pipe of each usage point so as to prevent the reverse flow of hot water.

Installing Glass Tubes

12. Use soap or oil on glass tubes then insert them into solar water heater tanks. Cover glass tubes with materials like canvas, cloth or cardboard till the proper plumbing connections are made and the solar water heater is supplied with regular cold water. This is to avoid the glass tubes overheating without water, which could lead to breakage.

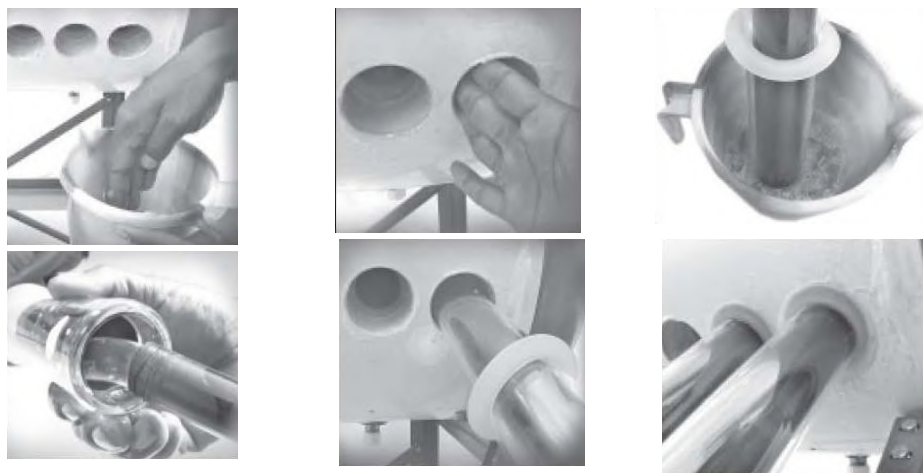


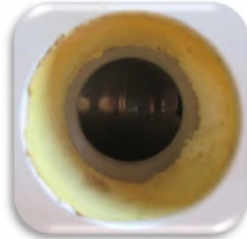
Fig 8

The glass vacuum tubes are inserted into the holes in the underside of the tank, and the bottom of the tube then retracted into the cradle, on the bottom of the stand.



The vacuum tubes are made from strengthened glass, however, caution is required when handling them to avoid breakages.

Solar tanks are heavily insulated, and the tubes pass through an aperture in the insulating foam, before engaging with the silicon seal fitted to the inner tank of the Main Tank. Care must be taken when fitting the tubes to ensure that no pieces of the foam are dislodged and pushed into the silicon seal with the tube. This is a common cause of leaks in newly installed tanks.



Aperture containing silicon seal

Fig 9

Care must also be taken with the seal itself. The seal is not attached to the tank; it is located into the fitting hole of the tank and stays in place because it has a groove all around it. Make sure that each seal is securely in place before you insert the vacuum tube. When the tube is inserted, it expands the seal slightly, which presses it against the metal of the tank making it watertight.

Fit the dust seal, a black/white, slightly dished ring seal supplied with the tubes. The purpose of this is to exclude dust and dirt from the area around the silicon seal. Note, this dust seal must be installed on the tube prior to insertion, and then pushed up to the right position once the tube is fitted.



Fig 10

Dust seals

When inserting the glass tubes into the metal cradle, ensure the white plastic cup is first located into position on the frame. The glass tube can then be slid into place.

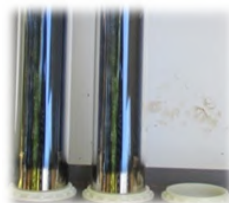


Fig 11

Vacuum Tube Installation

The vacuum tubes supplied with the tank are highly efficient. Left in the sun and left dry, they will easily attain an internal temperature of over 250° Celsius – a temperature that can cause both damage and injury.



Ensure that tubes are not exposed to sunlight before they are to be installed and remain covered at all times.



Each tube should be removed from its packaging ONLY when one is ready to install it. Tubes should ALWAYS be installed filled with water - to avoid the possibility of heat damage to the tank.



Ensure cold water is filled early in the morning when the temperature within the tubes is low to avoid damage to the glass tubes.

13. After the installation, allow the solar water heater to heat the water for a day of sunlight before using the hot water.
14. The solar water heater has a provision for back-up electrical heater. It should be installed by a trained electrician providing a proper earth and protecting the cable connections from water and moisture.

6. SYSTEM COMMISSIONING

On installation or after service it is important that the system is primed. This is carried out by first opening the incoming feed followed by the bleed cock and then observing when all air is expended from the bleed outlet. Proper priming is important or else the unit will not operate at full efficiency.

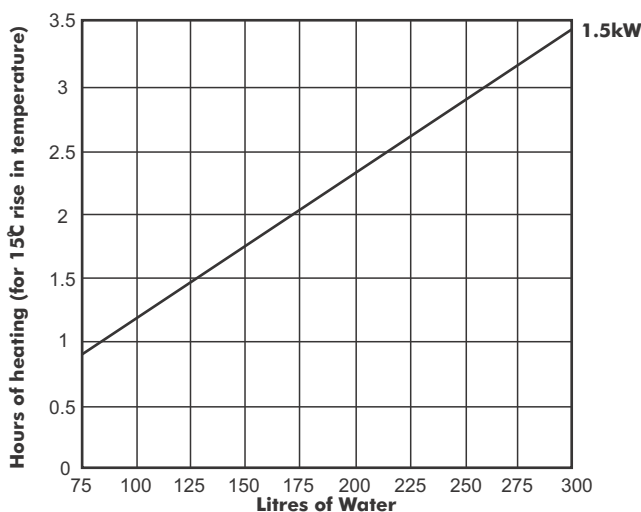
7. USAGE

It is important that the hot water availability is properly managed as solar energy heating only occurs between the hours of 9:00am - 4:00pm. This effectively means that hot water is available in the evening as any draw off will result in temperature reduction from the replacement cold water. If hot water is required in the morning there should either be no night time draw off or the booster heater should be used. Users should plan hot water usage accordingly.

The recommendations below will help to improve the overall efficiency of the solar water heater.

- Hot water will flow from usage point only after unheated water in pipeline flows out first.
- Plan the consumption of hot water in quick intervals at one time (either in the morning or evening) to minimize heat loss in the pipeline.
- Run the hot water slowly, this will avoid the mixing of hot and cold water in the solar water heater tank.
- Do not withdraw more than the rated capacity of the system on a single day.
- Use electrical backup when more hot water is required.

Heating time for 1.5kW element



- If a controller is used to turn on the electrical heater automatically, ensure it is set at 45°C . This is usually sufficient for a hot water shower. A higher setting will increase electricity bills unnecessarily.
- Paint the MS support stand once every five years. Though the supporting structure and other MS parts are powder coated for long rust-free life, inspect occasionally and paint them if need be.
- Regularly inspect the solar water heater tank to make sure it's not damaged and that no rainwater runs into the tank insulation. Also check for any rusting in the plumbing lines.
- To drain the water from solar water heater (for cleaning or repair), disconnect the cold water inlet pipe line and open the cold water inlet valve; If a feeder tank is used, close the cold water inlet valve and remove the drain pipe dummy to drain the water from the solar water heater tank.
- If the water is hard, it is recommended to clean the solar water heater tank and glass tubes with fresh water once a year to flush out settled scales.
- Any repairs or maintenance should be carried out by a qualified technician.

8. TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
Water is not flowing from the tap	Cold water inlet pipe or hot water outlet pipe from the solar water heater is choked by sediment or scales	Clean the pipes and descale as necessary
	Cold water inlet valve is shut	Open the valve
	Float valve in the feeder tank has jammed or choked	Clean the float valve or replace it
	Non return valve stuck	Clean the NRV or replace it
Not getting hot water	Air is trapped in the cold or hot water pipe line	Open the hot water outlet pipe near the valve and bleed the air or drain the water out of the tank and fill the solar water heater again
	The solar water heater is not receiving enough sun light	Expose heater to sunlight
	Excessive water consumption (undersized)	Plan water usage as per installed capacity. In case of high consumption use the electric back-up
	Incorrect connection of cold water and hot water pipes to solar water heater storage tank	Shorten the hot water plumbing line or increase the capacity of the system.
	Cloudy day, not enough sun light	Use the electrical back-up
Water is boiling and steam is being released from vent	Cold water pressure due to mixing valve preventing the hot water coming through	Run hot water slowly at first and then gradually open up the cold water tap for optimal mixing of hot and cold water at the point of use
	System not in use for a long time	If the system is not being used, cover the glass tubes with a shade or install a steam trap on the air vent.
	Failure of controller	Repair/ replace the controller

PROBLEM	POSSIBLE CAUSE	SOLUTION
Electrical backup not working	Wrong wiring connections	Check wiring
	Inappropriate set temperature	Set the controller for a comfortable bath between 35-45°C
	Lighting strike	Inspect/replace fuse, heater element and thermostat
	Short circuit	Inspect/replace fuse, heater element and thermostat
	Failure of controller	Repair/ replace the controller
The solar water heater is leaking	The solar water heater or plumbing line has a leak	Determine the source of the leakage and fix. If the problem persists, call authorised service provider
Water over flows from air vent or feeder tank	Reverse flow of cold water in the solar water heater tank (in case of mixing valve)	Close cold and hot water tap of the mixing valve
	Inappropriate air vent length	Increase the length of the air vent as per installation guidelines
	Float valve stuck in the feeder tank	Clean or replace the float valve in the feeder tank

9. TERMS OF WARRANTY

i) General Liability

- In lieu of any warranty, condition or liability implied by law, the liability of Dayliff (hereafter called the Distributor) in respect of any defect or failure of equipment supplied **is limited to making good by replacement or repair** (at the Distributor's discretion) defects which under proper use appear therein and arise solely from faulty design, materials or workmanship within a specified period. This period commences **immediately after the equipment has been delivered to the customer** and at its termination all liability ceases. Also the warranty period will be assessed **on the basis of the date that the Distributor is informed of the failure.**
- This warranty applies solely to equipment supplied and **no claim for consequential damages**, however arising, will be entertained. Also the warranty specifically excludes defects caused by fair wear and tear, the effects of careless handling, lack of maintenance, faulty installation, incompetence on the part of the equipment user, Acts of God or any other cause beyond the Distributors's reasonable control. Also, any repair or attempt at repair carried out by any other party **invalidates all warranties.**

ii) Standard Warranty

General Terms

If equipment failure occurs in the normal course of service having been competently installed and when operating within its specified duty limits warranty will be provided as follows:-

- **Up to 3 years- The item will be replaced or repaired at no charge.**
- **Over 3 years, less than five years - The item will be replaced or repaired at a cost to the customer of 50% of the Davis & Shirtliff market price.**

The warranty on equipment supplied or installed by others is conditional upon the defective unit **being promptly returned free to a Davis & Shirtliff office** and collected thereafter when repaired. No element of site repair is included in the warranty and any site attendance costs will be payable in full at standard chargeout rates.

DAYLIFF is a brand of **Davis & Shirtliff**
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