Notes for the User

You have just become a user of the most important energy source of the future – and yet the oldest one in existence. Correctly installed, it will provide many years of reliable service. The system revolves around the lightweight yet highly efficient AES collector. AES has many years of experience in this specialist field and selects only the highest quality components for their systems. The solar system contains a special solar fluid, which transfers heat from the solar collectors to the hot water storage cylinder. The pipework circuit is subject to a small pressure and should be fitted with all necessary safety features i.e. expansion vessel and pressure safety valve.

Fully automatic control is by a differential temperature controller (DTC). The DTC measures the temperature in the solar collector and, when this is (typically) 6ºC hotter than the temperature in the lower half of the cylinder switches on a circulating pump in order to transfer the heat. When the temperature difference has fallen to 4ºC the pump is switched off. The collectors are protected and solar benefit will be had all year round because the fluid in the system contains anti-freeze. The DTC automatically controls the operation of the circulating pump and, at the same time, provides a digital temperature read-out. For operation of the controller please refer to the DTC manufacturers instruction manual.

To ensure satisfactory operation of the system the following points should be observed: -

1) The system should always be left switched on even when the house is unoccupied. This will ensure that the fluid in the collectors does not boil and evaporate, possibly resulting in a service call.
2) If the property is to remain unoccupied for a lengthy period of time the solar panels should be covered.
3) Periodically check the pressure gauge. When installed, the system is pressurised. This will vary continually according to the temperature in the collectors. If the pressure falls below 0.5 bar, however, a service call may be required.
4) To maximise solar gain, it is advised auxiliary heating (e.g. gas boiler) be switched off during daylight hours.

Important Information

Limescale

In hard water areas the high temperatures experienced in solar cylinders can result in the accumulation of limescale. As a means of control, the differential controller can be set with a maximum store temperature of 60ºC. Limescale build-up will not occur within the closed loop of an indirect solar circuit.

Legionella

At temperatures between 20ºC and 46ºC there is an increased risk of legionella bacteria growth within the DHW system. In order to combat the risk of legionella bacteria growth, the water temperature needs to be raised to at least 60ºC once per day. For days with little solar availability and for winter months there is an auxiliary means of raising the temperature of the domestic hot water to at least 60ºC. This form of sterilisation should be accurately controlled by time and temperature to maximize solar gain e.g. the electric immersion or boiler should operate during non-daylight hours or periods of peak DHW draw-off.
The following formula is used to determine the minimum time of operation for the auxiliary heating to ensure sterilisation:

Minutes = (Cylinder capacity in liters x 4.2) / kW

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Temperature Controls

A solar system can at times produce scalding water or even high pressure steam. The safety devices of the primary circuit are suitably sized expansion vessel and pressure relief valve. The secondary circuit safety features include a dedicated solar volume of no less than 25 liters per m^2 of solar collector aperture and a maximum store temperature on the differential temperature controller, factory preset at 60ºC. A further safety feature for vulnerable groups, such as children or the infirm, is the use of a thermostatic mixing valve either at or within 450 mm of the point of use set no greater than 46ºC or at the hot water cylinder set at 55 – 60 ºC.

General

The solar water heating system should meet the requirements for electrical earthing and bonding in accordance with IEE Wiring Regulations.

Only competent person(s) should undertake any maintenance, repair or decommissioning work. Necessary skills are required in plumbing, electrical, roof work and access work. Individuals should have a high level of technical knowledge, be familiar with tools of the trade and have experience in current best practice.

Temperatures within the solar circuit can be in excess of 100ºC, therefore suitable pipework, supports, fittings and insulation should be used. Under no circumstances should plastic pipes or pipe clips, soft solder fittings or standard insulation be employed.

Insulation of the DHW cylinder should be at least equivalent to current best practice. All pipework should be insulated with high temperature insulation (e.g. Armaflex HT).

The solar collector can reach very high temperatures when exposed to sunlight. Cover the collector whilst carrying out any work on the system.

The solar system should have adequate frost protection. Fill the system with a suitable solar antifreeze fluid. Always read the solar antifreeze fluid label. Under no circumstances should water be added to premixed antifreeze fluid. The closed loop solar circuit should not be connected to the mains water supply.

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Maintenance (to BS5918:1989)

While a properly designed and installed heating system should be expected to give a service life comparable to that of other types of heating systems, some maintenance may be necessary to maintain the efficiency of the installation.

A maintenance inspection should be carried out annually, the anti-freeze solution should be replaced at 5 year intervals. During a maintenance inspection the following items should be checked:

1) That unions and glands are free from weeps.
2) That the glazing seals are weathertight and sound.
3) That the collector circuit is free from air.
4) That all air eliminators, non-return valves, solenoid valves (if applicable) and motorised valves (if applicable) are operating correctly.
5) That the correct solar fluid volume is maintained.
6) That the electrical controls are operating correctly to the manufacturer's instructions.
7) That circulating pump is operating without undue noise or vibration.
8) That all insulation is firmly attached.
9) That all covers are in place
10) That no condensation or damp spots are apparent, particularly around the pipes and fixings in the roof.
11) That the roof fixings are firm and the roof covering is free from cracks.
12) That the weathering is properly protecting the structure.
13) That the collector glazing is clean
14) That there is no damage to the glazing.
15) That there is no evidence of serious corrosion.
16) That any paintwork is sound.
17) That all sensing devices are firmly and properly in place.

Decommissioning

1) Switch off the electricity supply to the differential controller and pump.
2) Release the pressure in the solar circuit loop. This can be done by manually releasing the pressure relief valve.
3) Remove the air vent.
4) Drain the system form the drain valve, which should be located at the bottom of the solar circuit loop.
5) The system is now decommissioned.

If you can decommission the system in the early morning or late evening, it is safer for you as the panel will not be as hot so there is less chance of burning yourself on steam or pipe work. If this can not be done then take care, and be aware that there could be a burst of steam when you take any component off.

Remember that the non-return will have liquid above it so it will not naturally drain. You will need to remove / bypass / disable it, too fully drain the system.

Even after solar water collector has been drained, residual hot water or steam may still come out, sometimes in sudden bursts, for hours or days afterwards, particularly in bright or sunny weather. Pipes connected to the collector may get very hot, up to and above 100°C. The solar collector needs to be left with the air vent removed.

Notes for the User

Health & Safety

Always assess risks prior to commencement of any work on the solar system. Take all necessary precautions to eliminate, or minimise to a safe level, any potential risks. Potential hazards can result from high temperatures of solar components (including escaping steam), working at height / roof work, electrical work, manual handling and working in confined spaces. Keep the solar collector covered during any works. Wear appropriate PPE at all times. All works should be carried out in accordance to current health and safety regulations and recommendations