



SUN & HEAT SOLAR PRODUCTS

INSTRUCTIONS FOR USE, MAINTENANCE AND INSTALLATION OF THE **SOLAR** DOMESTIC WATER HEATER

THERMOSIPHON 150/2.5
(TYPICAL INSTRUCTIONS FOR A CLOSED LOOP
THERMOSIPHONIC SYSTEM ON A FLAT ROOF)



European Commission
Directorate General for Energy and Transport



ENERGIE PROGRAMME



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**(TYPICAL INSTRUCTIONS FOR A CLOSED LOOP
THERMOSIPHONIC SYSTEM ON A FLAT ROOF)**

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CAUTION

These Instructions for Use, Maintenance and Installation of the Solar Domestic Hot Water System Thermosiphon 150/2.5 accompany the product. They should be delivered to the Buyer by the authorized Installer upon completion of the installation and setting it up in operation

Table of Contents

FOREWORD

1. INSTRUCTIONS FOR THE USE OF THE SOLAR WATER HEATER	6
1.1 A general description of how a DHWS operates	6
1.2 Performance of a solar domestic water heater	7
1.3 Need for an auxiliary heater	8
1.4 Heat losses during the night	8
1.5 Use of hot water in a household	8
1.6 Clothes washing	9
1.7 Dishwashing with solar hot water	9
1.8 Efficient use of a solar domestic hot water system	9
1.9 Use of the back-up heating system (electric heater)	10
1.10 Freezing weather conditions	11
1.11 Summer holidays	11
2. TROUBLESHOOTING GUIDE	12
2.1 Normal operation (heating water by the sun)	12
2.2 Operation using the back-up electric heater.	12
3. MAINTENANCE INSTRUCTIONS	13
3.1 Regular inspections by the owner	13
3.2 Regular maintenance by an authorized dealer or the Service Department of SUN&HEAT	13
4. INSTALLATION INSTRUCTIONS	16
4.1 Components of the solar water heater	16
4.2 Necessary special tools and materials	16
4.3 Removing packaging	16
4.4 Collector orientation	19
4.5 Site	19
4.6 Assembly of the mounting frame	19
4.7 Fastening the collector on the mounting frame	23
4.8 Mounting the hot water storage tank	25
4.9 Installing the connection pipes between the storage tank and the collector	25
4.10 Connection to cold and hot water networks	29
4.11 Fastening the mounting frame to the floor of the roof	30
4.12 Filling the storage tank with water	30
4.13 Filling the closed loop with the heat transfer fluid	
4.14 Mounting the closed loop expansion tank & safety valve	33
4.15 Electrical connection of the electric heater	33
4.16 Exposure of the solar water heater to the sun	34
4.17 Additional installation tasks	34
ANNEX	35

CAUTION

Contact an authorized dealer or the Service Department of SUN&HEAT for the installation, repair and maintenance of this solar domestic hot water system.

IMPORTANT

SUN&HEAT provides a Guarantee for this product. Relevant terms are included in it.

IMPORTANT

Contact an authorized dealer or the Service Department of SUN&HEAT for the installation of a Mixing Valve, which restricts the hot water temperature from the solar water heater below 60oC (see paragraph 1.7)

BASIC PRODUCT SPECIFICATIONS

Solar collector area:	2.5 m ²
Absorber surface:	Copper fins, Matt black paint
Collector front cover:	Tempered glass 4mm thick
Collector tilt:	45° with respect to the horizontal plane
Hot water storage tank volume:	150 litres
Hot water storage tank corrosion protection:	Glass enameling
Hot water storage tank heat exchanger:	Double wall (or double jacket)
Auxiliary electric heater:	3 kW (220V)
Total volume of the closed loop:	7.2 litres

Foreword

Thank you for buying this, *Thermosiphon 150 /2.5*, SUN&HEAT solar domestic hot water system.

Please read through these instructions carefully and be sure to keep them handy in a safe place for future reference.

By following these instructions you will be able not only to take advantage of the high potential of the solar system for more hot water, but you will ensure its reliable performance and longevity.

1. INSTRUCTIONS FOR THE USE OF THE SOLAR WATER HEATER

The SUN&HEAT Solar Domestic Hot Water System, *Thermosiphon 150/2.5*, operates without any intervention. Just enjoy the hot water, which is heated by the solar radiation absorbed by the collector during the day.

Solar systems for heating water for homes have some important advantages:

- They save money for the user, as there is no cost involved in their operation.
- Hot water is continuously available.
- They offer pollution-free energy from the sun and contribute to the reduction of carbon dioxide (CO₂) emissions. Carbon dioxide contributes to global warming.

WARNINGS

- During the summer and at times when hot water is not consumed (e.g. holidays), high water temperatures (of the order of 90°C – 95°C) are likely to develop inside the water storage tank of the solar system. In this case, it might be advisable to shield part of the collector with opaque covering to avoid high water temperatures.
- In cases when high pressure develops inside the storage tank (for any number of reasons), it is likely that water will leak through the safety valve, which is activated for the protection of the tank. It is noted that this water may have high temperatures.

1.1 A general description of how a DHWS operates

The SUN&HEAT *Thermosiphon 150/2* consists of the collector, the hot water storage tank, where water is heated and stored, the support structure and the pipes connecting the collector and the tank.

The solar collector absorbs radiation from the sun and heats the heat transfer fluid inside it. This fluid is an antifreeze solution (with the addition of a corrosion inhibitor). When the fluid is heated, it passes through the collector loop (the pipes connecting the collector and the storage tank) and it heats the water inside the tank (through a heat exchanger). The circulation of the fluid in the collector loop is automatic and does not depend on the use of a pump. It is based on the fact that a liquid becomes lighter when heated (thermosiphonic flow, natural convection). The hot water storage tank has a double jacket type of heat exchanger.

1.2 Performance of a solar domestic water heater

The temperature of the hot water inside a solar water heater at the end of a sunny day depends on the available **solar radiation**, the **temperature of the water** supplied by the city network, the **ambient air temperature** and the temperature of the existing water inside the storage tank at the beginning of the day.

It is noted that hot water must reach a temperature of at least 45°C to adequately cover the needs of a household, without the use of the auxiliary heater.

- **Solar radiation:** The availability of solar radiation varies during the year. It is high during summer, but can reach only 1/3 of summer values during winter. It is noted that availability of solar radiation may also vary sometimes significantly from year to year.
- **City water temperature:** This temperature is not steady during the year. In winter, it is usually around 5°C - 10°C, while in summer it may exceed 25°C. Therefore, in winter, the temperature of city water must be raised by 35°C - 40°C, but in summer only by 15°C - 20°C.
- **Ambient air temperature:** Thermal losses of a solar water heater depend on outdoor air temperatures. The SUN&HEAT solar water heater that you have bought is well-insulated to minimize heat losses.

When hot water from the solar heater is used in the afternoon of a sunny day, its temperature remains steady for quite a long time. The temperature of the hot water during usage remains steady until a large percentage of the total volume of the water in the storage tank is consumed. This percentage also depends on the season of the year.

When the storage tank is full of cold water from the city network on a summer morning, the temperature of hot water at the end of the day is expected to reach approximately 55°C - 65°C. Respectively, on a sunny winter day, the water will reach a temperature of 35°C - 40°C.

These temperatures, at end of the day, depend on the city water temperature. The higher they are (as in southern locations) the higher the hot water temperature. Detailed data exist in the test report, based on relevant standards (EN 12976-2, ISO 9459-2), available by SUN&HEAT.

Considering two cities of the same country, one in the north and one in the south, the city water of the northern city is usually colder. Under these conditions, the domestic hot water system in the south produces hotter water and it seems to be more effective. Both solar domestic systems might deliver the same amount of energy from the sun to the domestic water.

1.3 Need for an auxiliary heater

From what has been previously mentioned, it is obvious that in winter, city water temperature is lower and there is less available solar radiation. In summer, however, city water temperature is higher and more solar radiation is available. Therefore, during the winter, it will be necessary to use a supplementary energy source. The back-up heating system of your solar water heater is an electric resistance.

The electric heater, as a supplementary source of energy, is also used in cases of insufficient or no sunshine (at any period of the year) or very high demand for hot water.

1.4 Heat losses during the night

Quite often, hot water is left in the solar water heater during the night. The hot water storage tank has strong thermal insulation, which prevents heat losses during the night. However, since ambient temperature during the night is low, the temperature of hot water in the storage tank decreases slightly. If hot water at a temperature of between 50°C - 60°C is left inside the solar system during the night, its temperature may drop by 4°C - 10°C by the next morning, depending on the area and the weather conditions (ambient air temperatures of 0°C - 10°C).

Detailed data exist in the test report, based on relevant standards (EN 12976-2, ISO 9459-2), available by SUN&HEAT.

1.5 Use of hot water in a household

Hot water in a household is usually used in the bathroom, in the kitchen (20% - 25% of the total hot water needs) and for washing clothes (30% - 35% of the total hot water needs).

You can make the most of your solar system by using its hot water for washing clothes in the washing machine, as well as washing dishes in the dishwasher.

From measurements made in households with a solar water heater in Southern Europe, it is estimated that the average consumption of hot water is 35 liters to 50 liters per person per day. This amount refers to hot water which is drawn by the consumer directly from the storage tank of the solar system.

1.6 Clothes washing

Hot water from a solar domestic water heater can be used in a washing machine in the case that it (the washing machine) has **two feeding pipes**, one for hot water and one for cold water. Such washing machines exist and their cost is not higher than the cost of a washing machine with one feeding pipe (cold water). Their washing cycle is faster, because it does not require time for water heating.

The use of washing machines with two feeding pipes (hot water, cold water) can increase the energy delivery from a solar domestic system. The faster washing cycle is an additional benefit.

Attention should be given to the maximum water temperature that is allowed by the manufacturer of the washing machine and considering the fact that the solar water heater may develop high temperatures under certain conditions.

1.7 Dishwashing with solar hot water

Hot water from a solar domestic system **can not** be used directly in a dishwasher. The reason is that the manufacturer of the dishwasher specifies a maximum temperature for the feeding water, usually of the order of 60°C. A domestic solar system can develop, during summer, water temperature higher than 60°C (it can be up to 95°C) under some conditions (limited use of the hot water).

A **mixing valve** (to mix in some cold water, see Figure 4.14) installed at the hot water outlet of the domestic solar system can control the hot water temperature so that it does not exceed 60°C. Under these conditions, hot water from the solar system can be used in a dishwasher. At the same time the user of hot water is protected from water temperatures higher than 60°C, which may cause burns to skin.

Mixing devices are used in many hot water applications in large installations, but they are rather expensive. Low cost, simple mixing devices exist that can be used in a domestic solar system. Their cost is lower than 50 Euro.

Please contact the authorised Service of SUN&HEAT for the installation of such a mixing valve.

1.8 Efficient use of a solar domestic hot water system

A solar collector is required to absorb solar irradiance and to transfer the absorbed energy into a heat transfer fluid with a minimum of heat losses.

The thermal efficiency of a solar collector is high when its operating temperature is low. In contrast, its efficiency is low when the operating temperature is high. In the

latter case, a collector at a high temperature loses energy towards the surrounding environment from all sides, especially through the transparent front cover (glass).

Therefore, the main principle for efficient operation of a domestic hot water system is for the water in the storage tank to be at a low temperature in the morning, when solar radiation begins to increase.

Thus, if there is a need to use the auxiliary electric heater during the night, in households with a nightly (off-peak) electricity rate, it is recommended to use the hot water by the morning of the next day. This way the solar collector will be able to start operating at a low temperature and therefore efficiently.

Another piece of advice is to use hot water during the day and not collectively at night or the following morning. In this case, increased efficiency rates have been measured in the order of 20%-25%.

1.9 Use of the back-up heating system (electric heater)

The SUN&HEAT solar water heater is equipped with an electric heater as a supplementary source of energy for the winter when the available solar radiation is rather low, or in case of insufficient or no sunlight or very high demand for hot water.

CAUTION

Repair work on the electrical parts of the solar water heater should only be done by a licensed electrician.

CAUTION

Do not use the electrical heater of your solar system to heat water in the case that there is an interruption of the water supply from the city network.

CAUTION

Do not use the electrical heater of your solar system to heat water in the case of freezing weather conditions or very low temperatures. Under these conditions, the water in the hot and cold water pipes (between the solar water heater and the house) may have frozen, interrupting the flow of hot water from the solar system to hot water taps in the house.

With frozen cold and hot water pipes, there is danger of destroying your storage tank, because of the expansion of the water in the tank, due to the heating and

its increasing temperatures, which may not be absorbed by the pipes of the city network or the safety valve.

1.10 Freezing weather conditions

In the case of freezing weather conditions, the SUN&HEAT closed-loop solar water heater is automatically protected, provided that, during installation, the correct solution of water and antifreeze (heat transfer fluid) was used (depending on the installation site).

Besides the solar water heater, piping is also exposed to freezing weather conditions. This concerns both pipes supplying cold water from the city network and pipes transferring the domestic hot water. These pipes should be insulated. In the case of frost, you should usually leave a light but steady flow of hot water running from a hot water tap in the house to protect piping.

CAUTION

In the case of freezing weather conditions, use the back-up heating system (electric resistance) only if you are sure there is a flow of water from the solar system to taps in the house, which means that the water in the pipes has not frozen. Otherwise, there is danger of destroying the storage tank (see paragraph 1.9)

CAUTION

If, for some reason, there is a leakage in the closed loop of the solar water heater and it is necessary to add heat transfer fluid, make sure you use the proper proportion of water, antifreeze and corrosion inhibitor (see paragraph 2.1).

1.11 Summer holidays

During summer holidays and in other cases when hot water from the solar water heater is not used, the water stored in the tank can reach very high temperatures (up to 90°C - 95°C). The SUN&HEAT solar water heater is designed to withstand these high temperatures. The owner of the system is not obliged to cover the collector in such cases. It might be advisable to cover the collector, thus avoiding the development of such high temperatures inside the storage tank.

2. TROUBLESHOOTING GUIDE

2.1 Normal operation (heating water by the sun)

If your solar water heater is operating inefficiently or is not heating the water in the storage tank, you must consult an authorized dealer or the service Department of SUN&HEAT.

Possible reasons for unsatisfactory performance of a DHWS are:

- low level of heat transfer fluid inside the collector loop
- a dusty or soiled collector surface
- an object shading the collector (e.g. a tree, a building, etc.)

Adding heat transfer fluid With suitable experience and tools, it is possible for the owner of the solar system to add fluid to the closed loop.

- A proper solution of water, antifreeze and corrosion inhibitor can be added to the top part of the tank (see paragraphs 4.13 and 4.14), either from the opening for the expansion tank or from the opening of the closed loop safety valve (see Figures 4.1).
- The fluid in the closed loop should be replenished at times when there is no sunshine, that is at times when the fluid in the closed loop is at a low temperature.
- Properly attach again the part removed (expansion tank, safety valve).

In the case when repeated addition of antifreeze solution is necessary, possible leakage points must be located and repaired. This must be done by an authorized dealer or by the Service Department of SUN&HEAT.

ATTENTION At times when there is sunshine, the fluid inside the collector loop and the expansion tank is at a very high temperature and pressure. Add fluid early in the morning or late in the afternoon, when the fluid temperature is low.

2.2 Operation using the back-up electric heater.

If your solar system does not heat water after turning on the electric heater, check the relevant electric fuse on the electrical switchboard.

In any other case, consult an authorized dealer or the Service Department of SUN&HEAT. If the problem arises after the summer or after you have been away on holiday, it is probably owed to the thermal safety switch of the thermostat. It can be repaired, in a matter of minutes, by an electrician, without needing to replace any spare parts.

3. MAINTENANCE INSTRUCTIONS

A SUN&HEAT *Thermosiphon 150/2.5* needs some basic maintenance. If maintenance tasks are done, high efficiency is ensured for many years.

Some action can be taken by the owner. Periodic maintenance and/or repair work must also be done by a specialized expert from the service department of SUN&HEAT or by an authorized dealer.

3.1 Regular inspections by the owner

The owner of a solar domestic water heater must visit the site where the solar system is installed (usually a roof top) every six months and should inspect it checking for

- possible breakage of the collector glazing, especially if there is the possibility of damage at the site where it is installed
- the cleanliness of the collector surface (dust, dirt, bird droppings, etc)
- the condition of the piping insulation
- possible leakage in the pipes which connect the solar system with the city water network and the house

The owner is advised to periodically clean the collector surface.

CAUTION

The collector should be washed at times without much sunshine, i.e. either early in the morning of a sunny day or later at the end of the day.

In any other case, it is advisable to consult an authorized dealer or the service department of the SUN&HEAT company.

The closed loop, which consists of the heat exchanger of the storage tank, the collector, the connecting pipes (between the storage tank and the collector), the expansion tank and the antifreeze solution, does not require any intervention by the owner (except for adding some heat transfer fluid, paragraph 2.1).

3.2 Regular maintenance by an authorized dealer or the Service Department of SUN&HEAT

The following inspections and maintenance tasks are recommended every 5 years. In areas where the water from the city network is hard (high in mineral content) or contains impurities or dirt, more frequent maintenance is advisable.

Maintenance tasks should be done by either an authorized dealer or by technical experts from the Service Department of SUN&HEAT.

Maintenance consists of inspections (and possible repairs) and also replacement of some parts for each component of the solar system as shown below:

-
- | | |
|------------------------|--|
| Solar collector | <ul style="list-style-type: none">- inspection of the collector front cover, i.e. the glass (for breakage, dirt/dust, shading)- inspection of the components fastening the collector with the support structure (see Figure 4.7a and 4.7b)- inspection of the water tightness of the collector (sealing material of the glazing, the pipes, etc)- inspection of the insulation. |
|------------------------|--|
-

- | | |
|---------------------|---|
| Storage tank | <ul style="list-style-type: none">- replacement of the combined "safety (pressure) and one-way valve" in the inlet of the cold water to the tank- inspection of the inside of the tank and removal of any mineral deposits from the domestic water- inspection of the electric heater and the thermostat- inspection of the anode- inspection of the metal flange with the electric heater, thermostat and the anode- replacement of the sealing flange of the above metal flange- inspection for leaks at the connection points of pipes which were dismantled- replacement of washers (blue, red) in the tank at the points of the inlet and outlet pipes. |
|---------------------|---|
-

- | | |
|-----------------|--|
| Supports | <ul style="list-style-type: none">- inspection of the mounting frame of the solar system (components and fastening to the floor) |
|-----------------|--|
-

- | | |
|--------------------|---|
| Closed loop | <ul style="list-style-type: none">- inspection of the parts of the closed loop (connecting pipes, expansion tank, insulation, etc)- replacement of the fluid inside the closed loop, use of new antifreeze and corrosion inhibitor- replacement of the safety (pressure) valve of the closed loop |
|--------------------|---|
-

Piping to the house etc	<ul style="list-style-type: none"> - inspection of the insulation of the hot and cold water pipes connecting the solar system with the house - inspection for leakage from the same pipes (soldering, connections, etc). - inspection of the water pressure reduction equipment for the city water (in case that such a device is used).
Proper operation by the sun	- inspection of the efficient operation of the solar water heater by the sun.

ATTENTION

It is advisable to record data concerning maintenance after an inspection or after repair work has been done on your solar domestic hot water system. In the Annex at the end of this leaflet, there is a special table to record such data. You must demand that the technical expert fill in the appropriate information concerning maintenance and / or repair work, spare parts and the remaining data shown in the Annex.

4. INSTALLATION INSTRUCTIONS

For the efficient and reliable operation of the solar water heater, it is necessary to follow the installation instructions that are listed in this Chapter of this leaflet.

4.1 Components of the solar water heater

The basic components of the solar water heater *Thermosiphon 150/2.5* are shown in Figures 4.1a and 4.1b in the next pages.

The solar heater is delivered to the customer in three separate packages. One contains the storage tank, the second the collector and the third the mounting frame and all other required components, i.e.

- the plastic pipes for the closed loop (Figure 4.1a, components 7 and 8) and required fittings
- the expansion tank and the safety valve of the closed loop (Figure 4.1a, components 5 and 6) as well as required fittings
- the combined "safety and one-way" valve in the cold water inlet of the hot water storage tank (Figure 4.1b, component 10) as well as required fittings
- two containers (one litre each) with antifreeze
- the required quantity of corrosion inhibitor
- screws and nuts for the mounting frame and for attaching the collector on the mounting frame

It is recommended to remove all packaging material from the tank, the collector, the mounting frame and the other components at the site, where the solar water heater will be installed, in order to avoid damaging the equipment when moving it.

4.2 Necessary special tools and materials

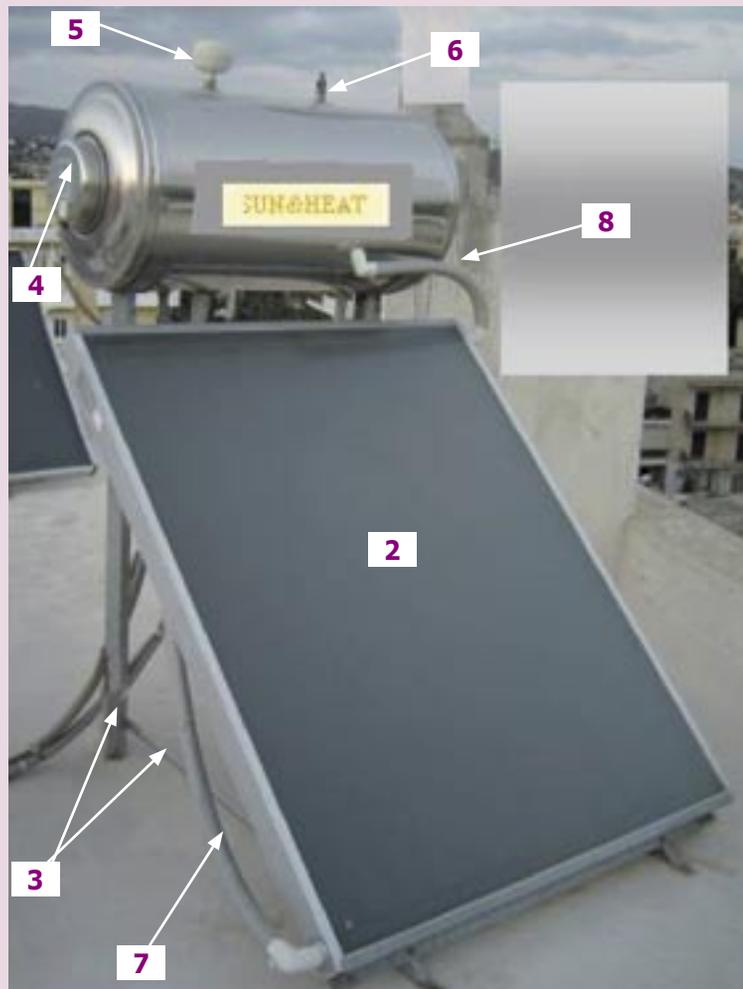
The following special tools and materials must be used for the proper installation of the solar water heater (provide list).

4.3 Removing packaging

Before starting the installation of the solar water heater, you must remove packaging material from the storage tank and the collector, taking care not to support their weight on the inlet/outlet connecting points. Remove the protective plastic caps from the connecting ends of the collector and hot water storage tank.

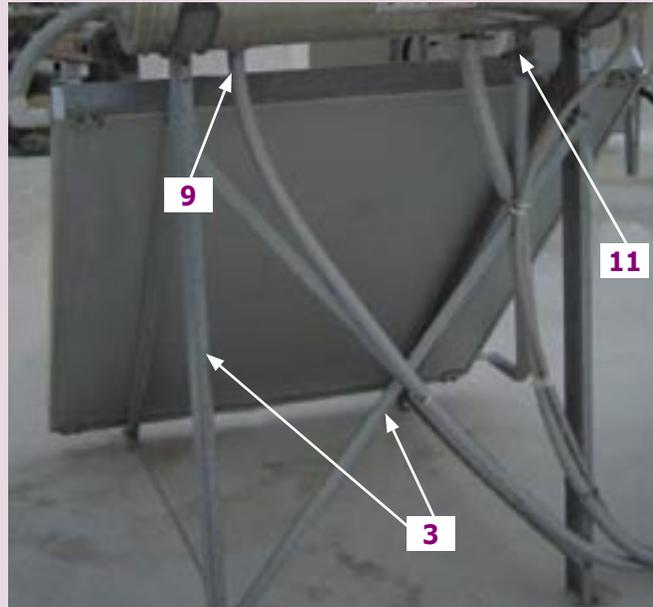
CAUTION

Make sure that the collector is not heated by the sun during the installation, by appropriately covering it.



1. Hot water storage tank
2. Solar collector
3. Mounting frame
4. Electric heater flange side of the tank
(electric heater, thermostat, anode)
5. Expansion tank of the closed loop
6. Safety valve (pressure) of the closed loop
7. Closed loop "cold" pipe (fluid flows from the tank to the collector)
8. Closed loop "hot" pipe (fluid flows from the collector to the tank)

Figure 4.1a Basic components of the *Thermosiphon 150/2.5* solar water heater



- 1. Hot water storage tank
- 2. Solar collector
- 3. Mounting frame
- 9. Domestic hot water outlet from the storage tank
- 10. Combined "safety (pressure) one-way" valve
- 11. Domestic cold water inlet to the storage tank

Figure 4.1b Basic components of the Thermosiphon 150/2.5 solar water heater

4.4 Collector orientation

The solar collector should face true south in order to have as much solar energy falling on it as possible, during a day.

In many cases, a slight westerly orientation is preferable to true south, in order to take advantage of the afternoon's higher outdoor temperatures, which leads to better collector performance.

Divergence of up to 20° from southern orientation creates a very small reduction of the amount of solar irradiation on the collector plane. For greater divergence of up to 45°, the reduction is in the order of 15% during winter months and relatively small (approximately 5%) during summer months.

4.5 Site

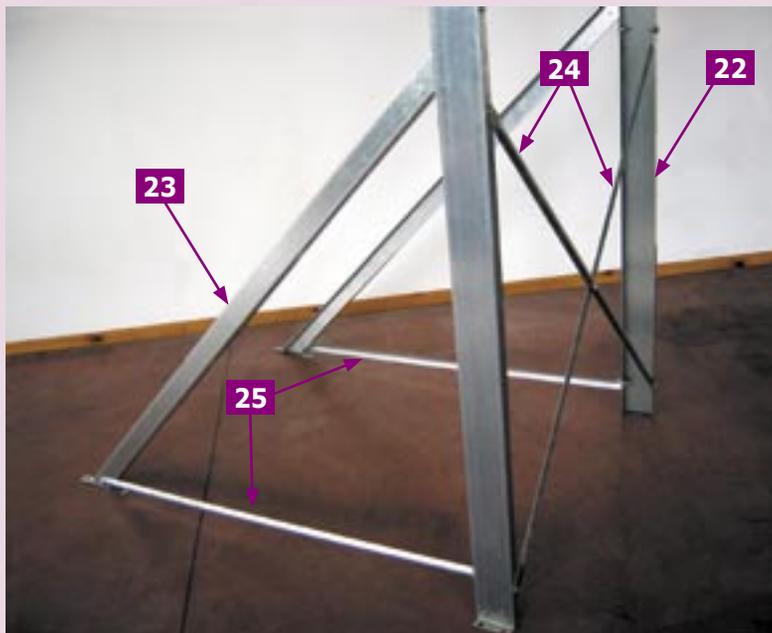
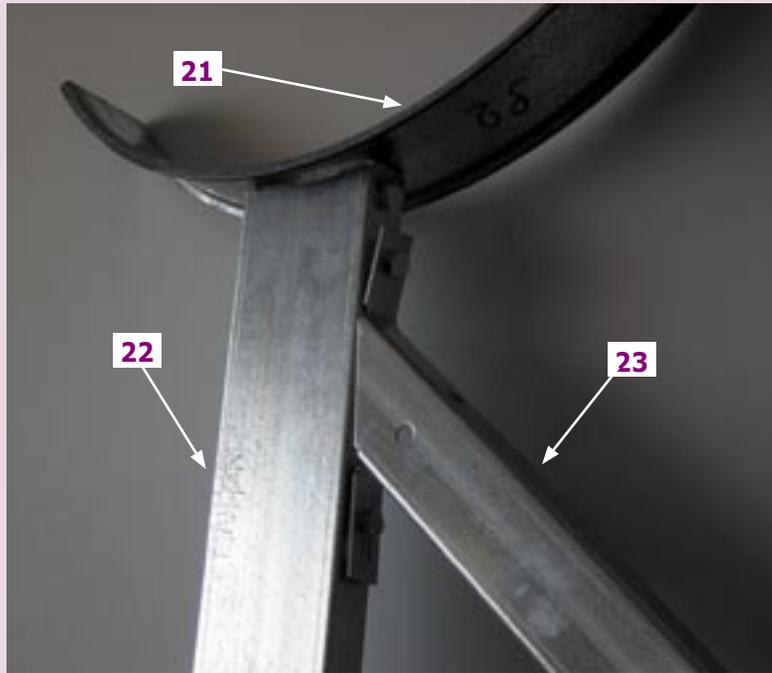
You must select the site where you will install the solar water heater so that:

- the collector is not shaded by trees, buildings or other solar systems, because their shadow during the period 09:30 to 15:30 will reduce the performance of the solar water heater (small shadows early and late in the day make no difference in it)
- it is possible to install and fasten the solar heater in a reliable way on the flat roof of the building.
- the distance between the solar water heater and the point of consumption of hot water (bathroom, kitchen) is the shortest possible.
- the installation is made by occupying space on the roof wisely, allowing the installation of more solar systems.

4.6 Assembly of the mounting frame

The successive steps to be followed for the assembly of the mounting frame are shown in the Figures 4.2, 4.3, 4.4, 4.5 and 4.6.

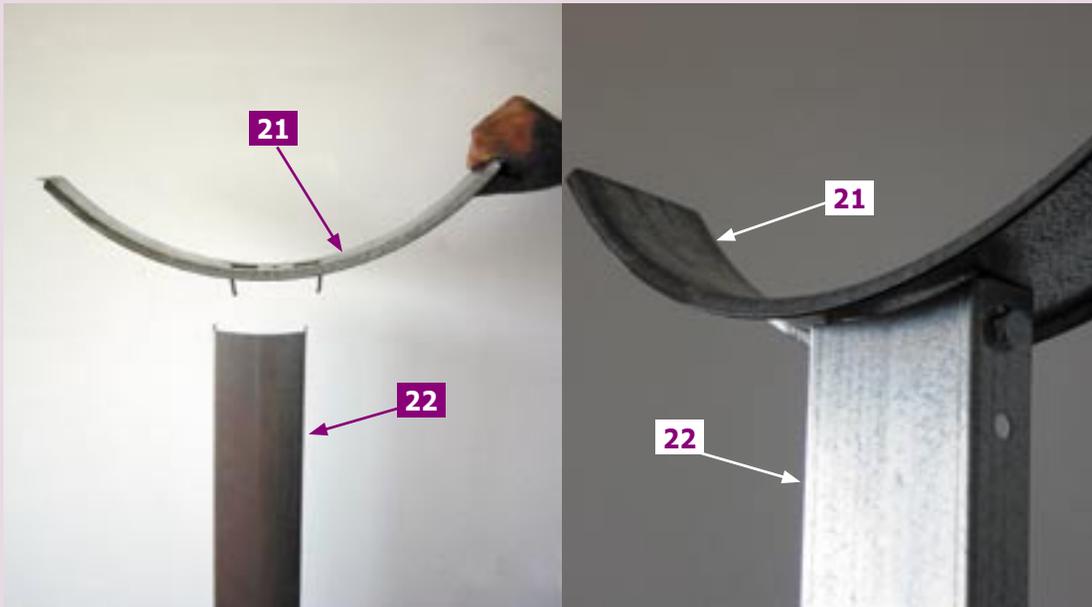
The mounting frame has to be moved to its final location. Its fastening to the floor of the roof will take place at a later stage (see paragraph 4.11).



- 21. Tank circular arc support
- 22. Vertical leg
- 23. Inclined (45°) leg
- 24. Diagonal connector
- 25. Horizontal connector

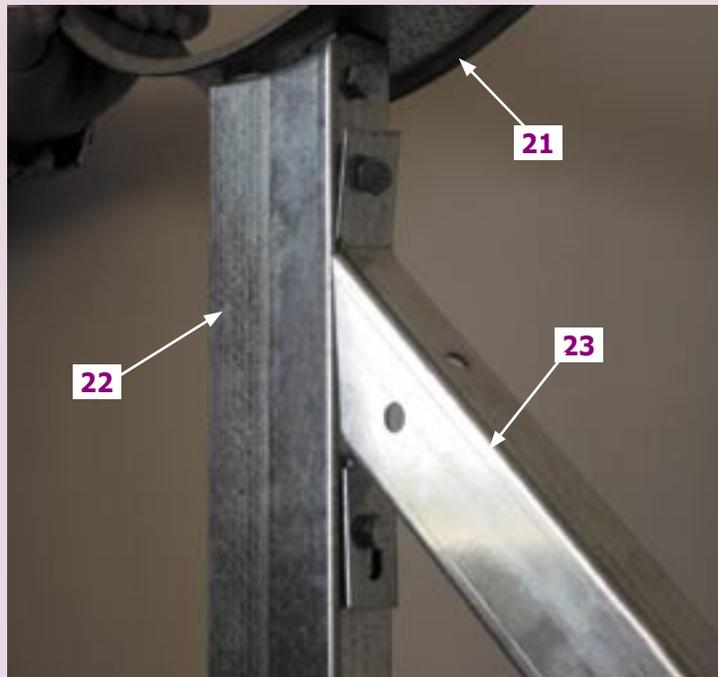
- 27. Lower collector support bar (see Figure 4.7a)
- 28. Upper collector support bar (see Figure 4.7b)

Figure 4.2 Part of the mounting frame of the solar water heater Thermosiphon 150/2.5



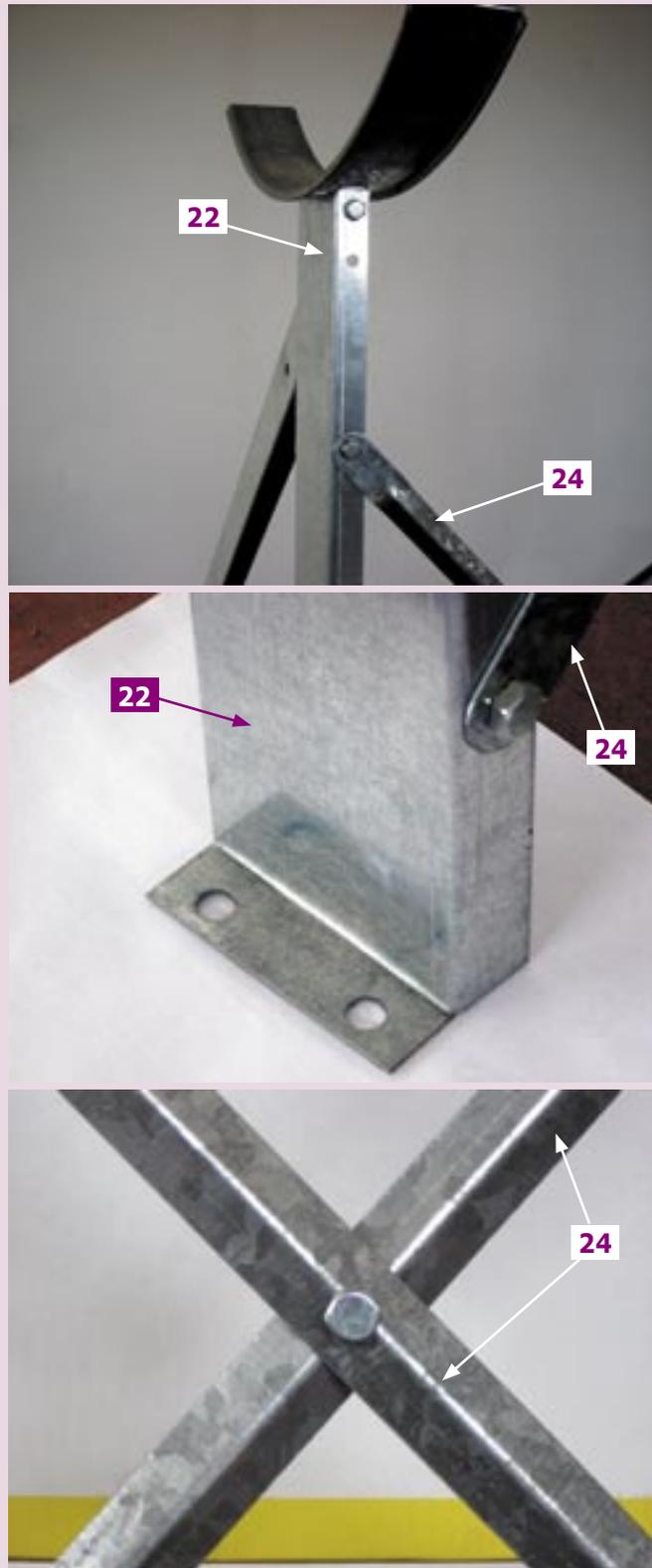
21. Tank circular arc support 22. Vertical leg

Figure 4.3 Attaching the tank circular arc support to the vertical leg (Step 1).



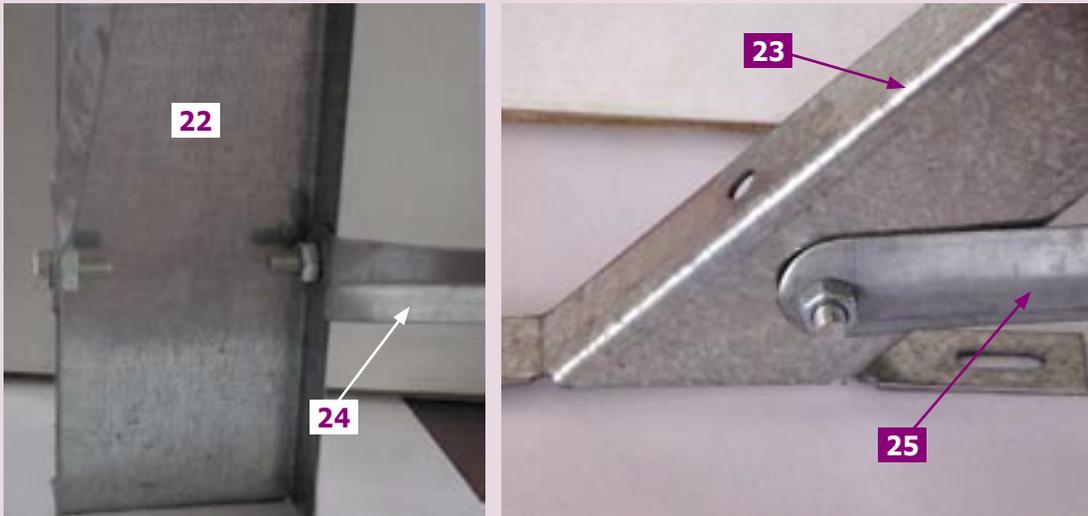
21. Tank circular arc support 22. Vertical leg
23. Inclined (45°) leg

Figure 4.4 Attaching the inclined leg to the vertical leg of the mounting frame (Step 2).



22. Vertical leg 24. Diagonal connector

Figure 4.5 Attaching the diagonal connectors between the two vertical legs (Step 3).



22. Vertical leg 23. Inclined (45°) leg 25. Horizontal connector

Figure 4.6 Attaching the horizontal connector between the inclined and the vertical legs (Step 4).

4.7 Fastening the collector on the mounting frame

Attach first the lower collector support bar in the mounting frame, as it shown in the upper photo of Figure 4.7a. Please do not tighten fully the screws.

Bring and put the collector on the mounting frame. Make sure that the (not fully tighten) lower collector support bar (its upper edge) is inserted in the notch existing in the collector frame (see Figure 4.7a, lower photo).

Bring and attach the upper collector support bar, as shown in Figure 4.7b. Again make sure that the upper collector support bar (its lower edge) is inserted in the notch of the collector frame.

It is emphasized that it is necessary to place the collector, so that it has a slight upward tilt to the right, as you look at it from the front (Figure 4.1a). If it is tilted in the wrong direction, the solar water heater will not function properly (improper thermosiphonic flow / natural convection).

Finally, tighten all bolts and nuts of the lower and upper collector support bars.

CAUTION

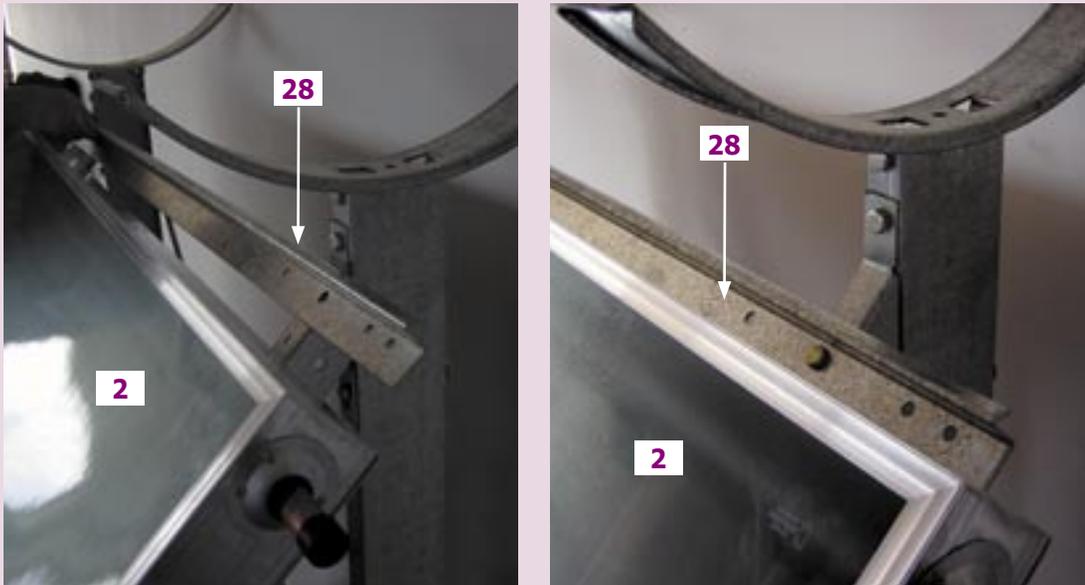
Please use, in a **sunny day**, an opaque material (from the packaging or other) to cover the glass of the collector. The collector must remain covered until the completion of the installation i.e. until the storage tank is filled with

water and until the closed loop is filled with the heat transfer fluid. Exposing a “dry” collector to the solar radiation will cause the absorber to develop high temperatures (more than 150°C). Under these conditions, there is the possibility of boiling of the heat transfer fluid (when it will be put in the collector) and as a consequence the danger of an accident. In addition, the connecting ends of the collector will develop high temperature.



2. Solar collector 27. Lower collector support bar

Figure 4.7a Fastening the collector on the mounting frame (Step 1).



1. Solar collector 18. Upper collector support bar

Figure 4.7b Fastening the collector on the mounting frame (Step 2).

4.8 Mounting the hot water storage tank

Place the tank onto the mounting frame evenly between the two vertical legs (see Figure 4.1a), with the electric heater flange side to the left, as you look at the solar heater from the front.

Further make sure that the storage tank is installed in such a way that the two outlets of the closed loop for the expansion tank and the safety valve are on the highest point.

4.9 Installing the connection pipes between the storage tank and the collector

Figure 4.1a provides an overall picture of the connecting pipes between the collector and the hot water tank

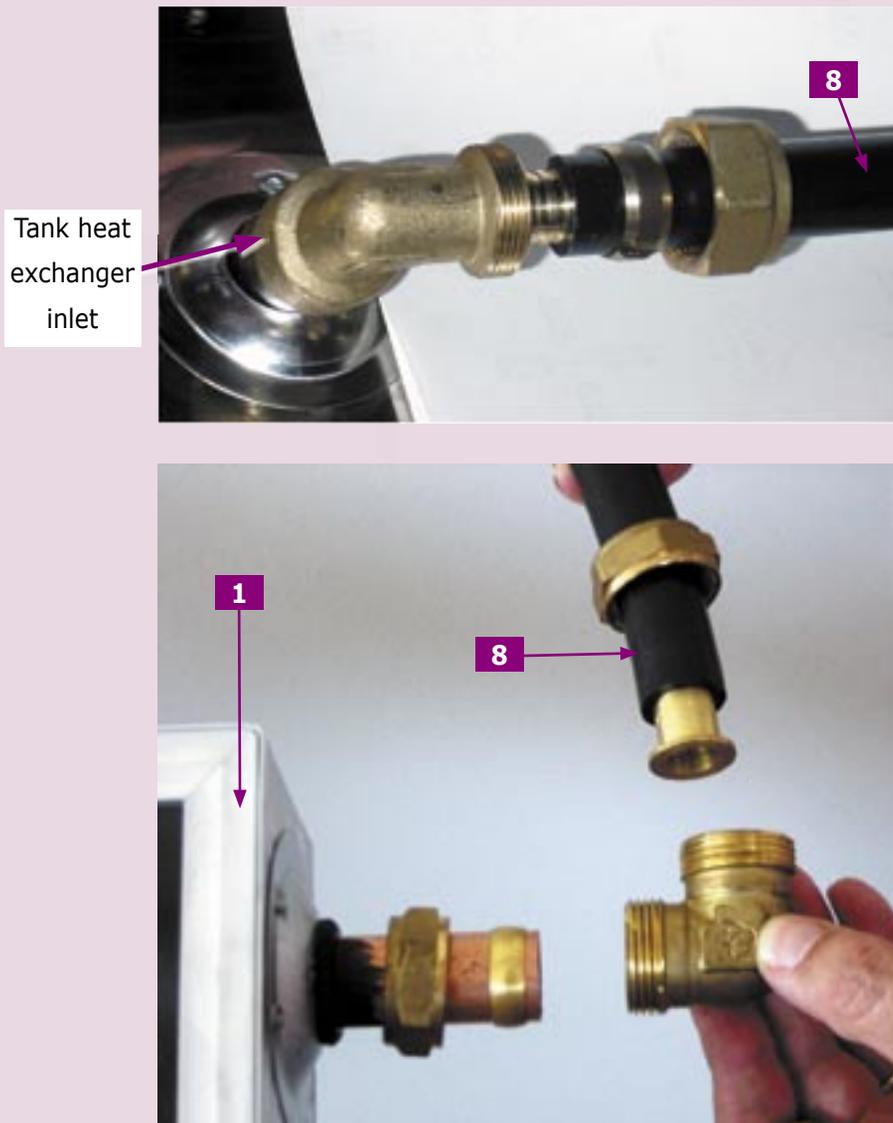
Figure 4.8 shows the connection pipe and the fittings between the collector outlet and the inlet to the heat exchanger of the tank.

Figure 4.9 shows the connection pipe and the fittings between the outlet of the heat exchanger of the tank and the inlet to the solar collector.

Before making any connection, the pipe thermal insulation (see Figure 4.10) should be passed outside from the plastic connecting pipes.

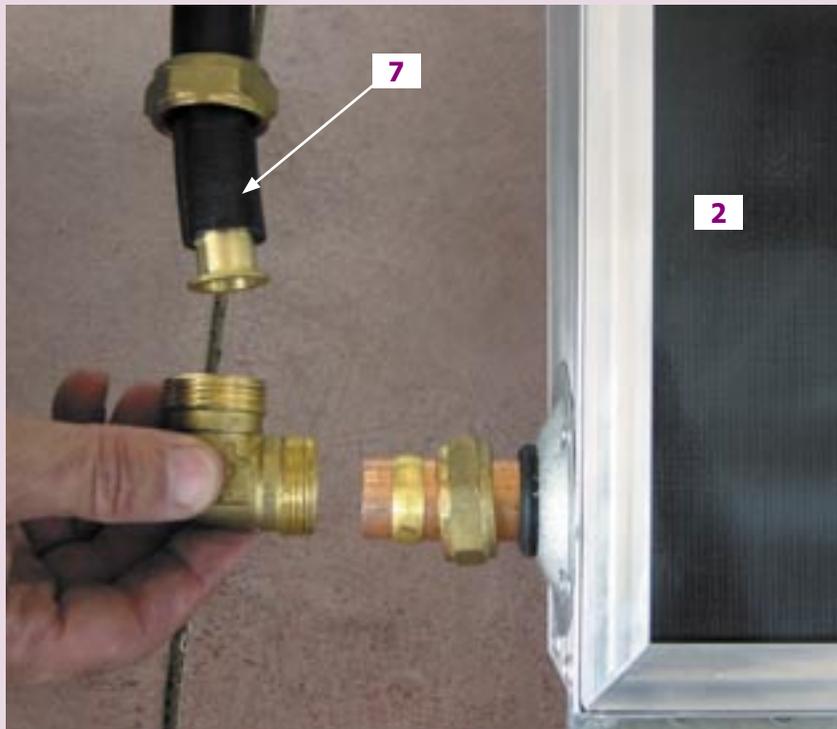
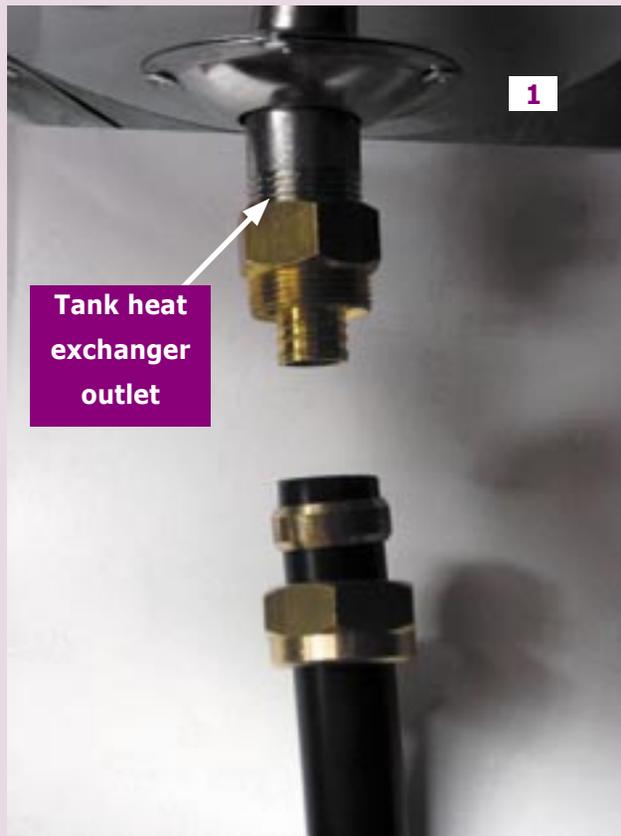
The length of the insulation is longer than the corresponding pipes, so that the insulation can cover also the fittings at all connecting points, as shown in Figure 4.11.

In Figure 4.12 vinyl tape has been used to attach the pipe insulation in the fitting at the inlet to the heat exchanger of the tank. Similarly vinyl tape has to be used in the collector inlet and outlet.



1. Hot water storage tank
2. Solar collector (upper corner)
8. Closed loop "hot" pipe (flow from the collector to the tank)

Figure 4.8. Connection pipe and fittings between the collector outlet and the inlet to the heat exchanger of the tank

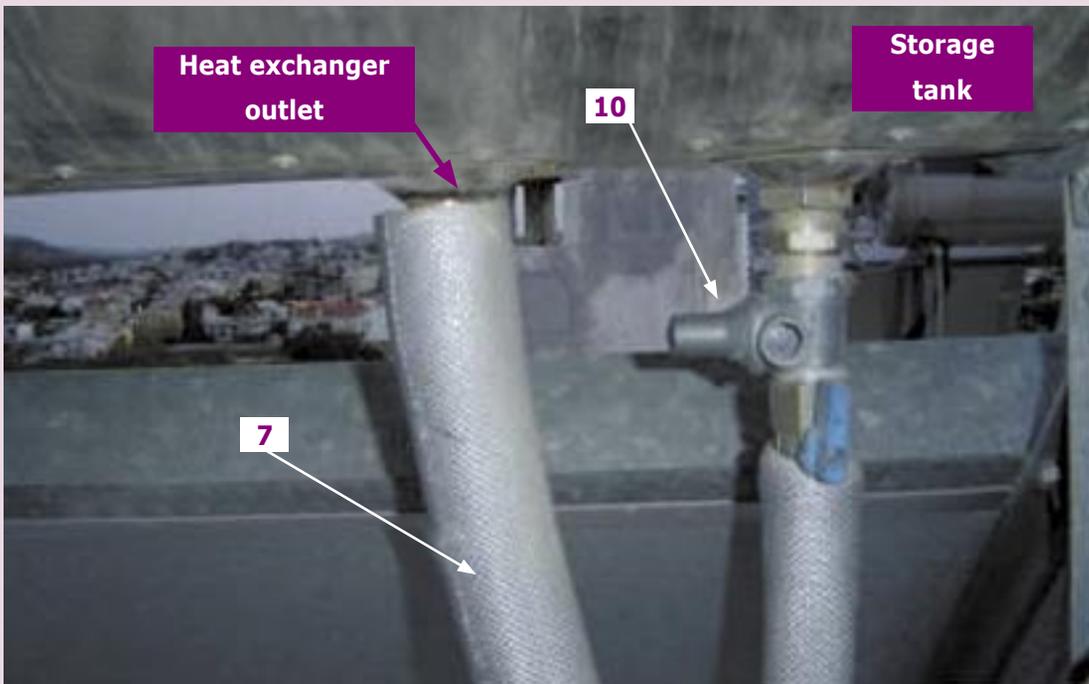


1. Hot water storage tank 2. Solar collector 7. Closed loop "cold" pipe
(flow from the tank to the collector)

Figure 4.9 Connection pipe and fittings between the outlet of the tank heat exchanger and the collector inlet

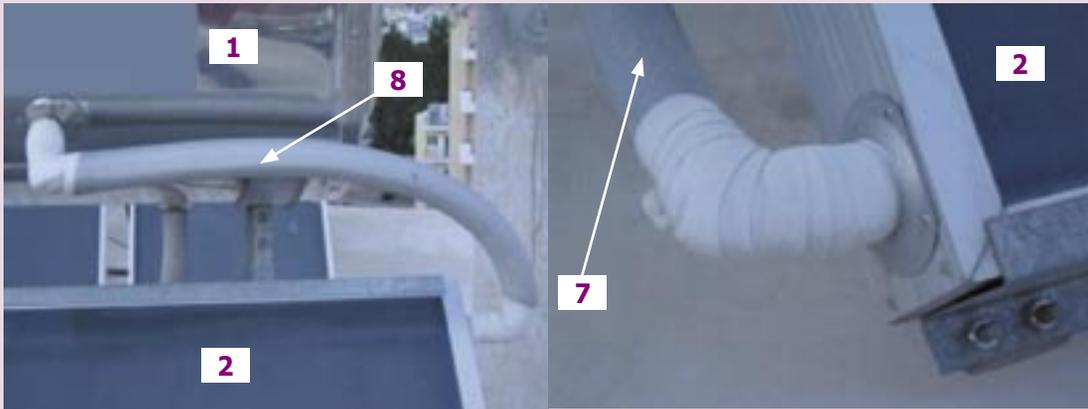


Figure 4.10
Thermal insulation for the connecting pipes
between the collector and the tank



1. Hot water storage tank 7. Closed loop "cold" pipe (flow from the tank to the collector)
10. Combined "safety (pressure) one way" valve

Figure 4.11 The insulation of the pipe 7 covers completely the fitting
at the outlet of the heat exchanger of the tank



1. Hot water storage tank 2. Solar collector 7. Closed loop "cold" pipe (flow from the tank to the collector) 8. Closed loop "hot" pipe (flow from the collector to the tank)

Figure 4.12 Tape is used to attach the thermal insulation in the fitting at the inlet of the heat exchanger of the tank and at the inlet and outlet of the collector

4.10 Connection to cold and hot water networks

Connect the combined "safety (pressure) and one-way" valve to the cold water inlet of the storage tank (blue washer), as shown in Figure 4.13

- No other components should be inserted between the combine valve and the tank.
- Make sure that the arrow on the combined valve points towards the storage tank.

Connect the city water supply pipe to the combined "safety (pressure) one way valve.

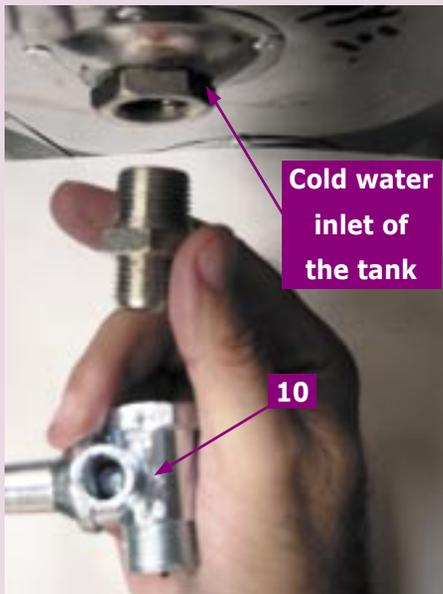
Connect the hot water outlet (red washer) of the hot water storage tank with the household hot water network.

It is strongly recommended to install, close to the solar water heater, two valves. One in the cold water supply pipe and one in the hot water pipe to the house, in order to be able to isolate the solar heater for any kind of intervention (maintenance, repair) on it.

IMPORTANT

It is recommended to discuss with the customer the possibility for the installation of a Mixing Valve (see paragraph 1.7). Such a mixing valve is not provided.

In case that the customer agrees for its installation, please install it as it is shown in Figure 4.14.



1. Hot water storage tank (lower part)
10. Combined "safety (pressure) one-way" valve

Figure 4.13 Attaching the combined "safety (pressure) one-way" valve to the cold water inlet of the storage tank

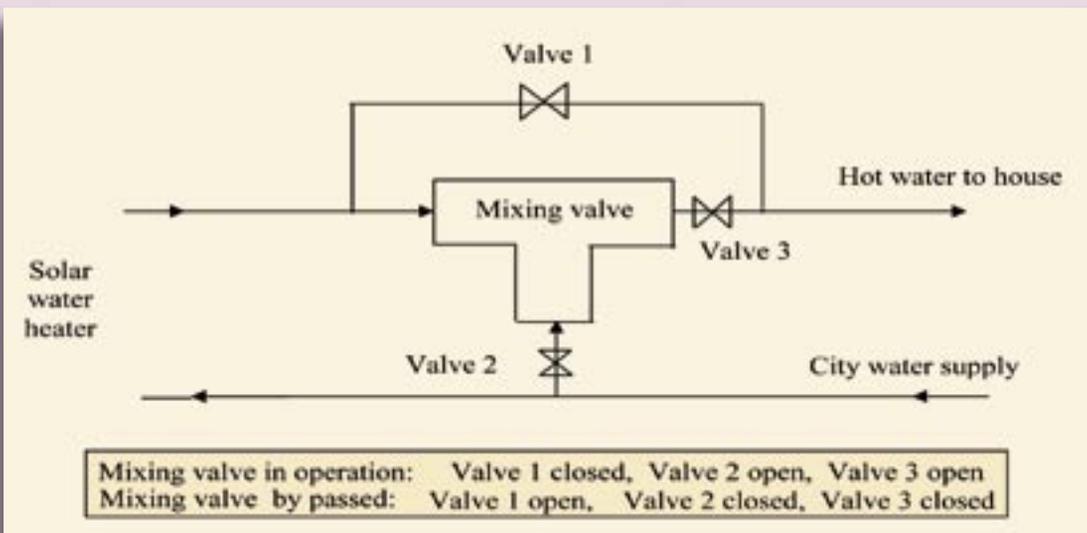


Figure 4.14 Schematic diagram for the installation of the Mixing Valve

4.11 Fastening the mounting frame to the floor of the roof

The mounting frame is already in its final location and the various components of the solar water heater have been attached on it.

The steps for fastening the mounting frame on the floor of the flat roof are shown in Figure 3.15, together with the required fastening components.

Special attention should be given to the water proofing of the points of fastening. Silicone sealer should be put in the holes, before inserting the fastening parts. Further, silicone sealer should be put around the fastening points, as shown in the lower photo of Figure 4.15.

4.12 Filling the storage tank with water

After the fastening of the mounting frame, start filling the storage tank with water from the city network.

Some hot water tap in the house should be open for the removal of the air from the tank during the filling process.

After the tank is filled and pressurized, check for any leaks at the various connecting points.

4.13 Filling the closed loop with the heat transfer fluid

The volume of the closed loop (collector, tank heat exchanger, connecting pipes) is 7.2 litres.

A quantity of 2 litres of antifreeze accompanies the solar water heater, which provides protection up to an ambient air temperature of -10°C .

For protection at lower ambient air temperatures you must use a larger amount of antifreeze. The table on the antifreeze container shows the required proportion of antifreeze and water, according to the desired minimum ambient air temperature.

Mix all of the antifreeze liquid with the appropriate quantity of clean water in a container. Please add the provided quantity of the corrosion inhibitor.

WARNING

The collector ought to have been shielded from the solar radiation, in a sunny day, during the whole period of installation with an opaque cover. If not, wait until the absorber is cooled down before adding any heat transfer fluid in the closed loop.

Slowly fill the closed loop with "water - antifreeze - corrosion inhibitor" solution from one of the two openings at the top of the storage tank (see Figure 4.1a), i.e. the points of mounting the closed loop safety valve and the closed loop expansion tank.

You must fill it slowly so that enclosed air bubbles can escape from the closed loop.



Figure 4.15 Steps for fastening the mounting frame on a flat roof and water proofing of the relevant point

4.14 Mounting the closed loop expansion tank & safety valve

The location for the mounting of the closed loop expansion tank and safety valve (pressure) is shown in Figure 4.1a.

CAUTION

Do not add any heat transfer fluid in the expansion tank. The expansion tank should be empty when the closed loop is under cold conditions.

4.15 Electrical connection of the electric heater

The connection of the electric heater of the storage tank with the main power supply source of the house should be done by a licensed electrician and according to the regulations in force.

A separate electric cable and circuit breaker should be used to provide power to the electric heater. It is recommended that the cable is inside of an appropriate protective pipe.

For the connection of the power cable you should first remove the cover of the flange of the hot water storage tank, with the electric heater, the thermostat and the anode. The cable to the electric heater should be connected according to the instructions shown on the connecting terminals in the flange of the storage tank (see Figure 4.16).

The thermostat should be adjusted so that the electric heater does not raise the water temperature more than the level of 55°C. Make sure that the tank is full with water before you switch on the electric heater for checking purposes.



Figure 4.16 Flange side of the hot water storage tank with the electric heater, the thermostat and the anode

4.16 Exposure of the solar water heater to the sun

After completion of the installation, remove the opaque cover from the solar collector. Under these conditions, the solar heater starts to operate on a sunny day. Please check

- the closed loop for any leaks
- the proper operation of the solar water heater

On a cloudy day, the inspection for leaks of the closed system and the proper operation of the solar water heater can not be performed. Please return on a sunny day for these tasks.

4.17 Additional installation tasks

It is important for the reliable operation of the solar water heater to perform the following tasks

- Insulate the hot and cold water pipes for higher efficiency and protection against frost.
- Fix the pipes onto the floor surface as well as onto the walls, to avoid problems appearing during operation of the solar water heater
- It is recommended that the insulation, covering the pipes, is either shielded from the solar radiation by appropriate material or it must be painted with special paint, so as to avoid degradation.

CAUTION

If the pressure of the water coming from the city network exceeds the value quoted on the label of the storage tank, you must install a pressure reducer device at the inlet of the city water and after the meter of the water utility company, according to the regulations in force for plumbing installations. It is emphasized that the storage tank is designed to withstand the pressure specified on its label and you are covered by the warranty for pressure up to this value.

ANNEX

1. Date:	Service by:
Description of works:	
New parts:	
Comments:	
2. Date:	Service by:
Description of works:	
New parts:	
Comments:	
3. Date:	Service by:
Description of works:	
New parts:	
Comments:	

ANNEX

4. Date:	Service by:
Description of works:	
New parts:	
Comments:	
5. Date:	Service by:
Description of works:	
New parts:	
Comments:	
6. Date:	Service by:
Description of works:	
New parts:	
Comments:	



in the framework of the project:
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PART B: Italy, France, Romania, Bulgaria, and Turkey
Contract No.: NNE5/2002/86

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