

# What is Quality in a Glazed Panel?

How should glazed solar panels be built?

For a green future.®



## General principles

Solar panels are a safe and environmentally friendly way of producing heat. It makes no sense to us at Thermosolar if the panels need to be regularly changed, maintained or serviced. We at Thermosolar think that they should be built strongly; they should have a very long working life and should require no maintenance producing versatile controllable heat for homes and industry.

They should be designed for use as a sealed system through heat exchangers rather than directing potable water through the panels so that they can be used for maximum efficiency with more than one heat circuit if needed. Solar systems built with our panels should be very low maintenance structures with as strong and nearly as long lasting as the building they serve.

The materials used should be recyclable and environmentally benign but strong long lasting and of the highest quality. Thermosolar panels are built to these standards.

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## The panel box should be light but strong -strong as a roof

### Thermosolar panels

The panel tray is stamped from a single sheet of aluminium manganese alloy, anodised for corrosion protection. This seamless method of construction is not only very strong, but there are no rivets to come undone and no seams which can act as weak point in the structure which will be subjected to large amounts of thermal stress.



### Other Panels

Most other panels are made up of a tray constructed by welding aluminium profile together and then welding a back sheet, to form a box. This generally means that the panels have to be thicker and heavier without being stronger.



**Thermosolar is light but very strong**

## The glazing should be strong low reflection high absorption and low emissivity

### Thermosolar panels

The glass is safety solar low iron tempered glass 4mm thick. It is TUV tested to withstand golf ball sized hailstone. It is highly transparent and allows more than 93% of available light to reach the absorber plate. This glass will not let you down.

### Other Panels

Some use environmentally unfriendly plastic (which discolours and decays over time) and others use low iron tempered glass but without the TUV hailstone resistant testing.



Thermosolar glazing is durable, tested to withstand extreme weathers and made from environmentally friendly materials?



Thermosolar panels on the environmental testing station of the Zugspitze



## The absorber plate should be of long working life

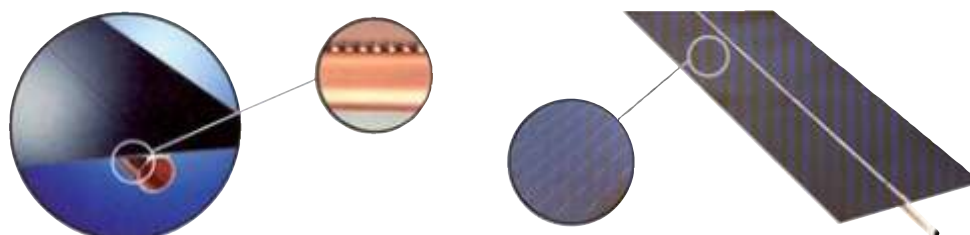
### Thermosolar panels

The absorber plate is made of a single sheet of aluminium and using a specially patented technique is folded around the heat pipe. This means that there is virtually a 360° contact between the heat pipe and the absorber plate. This method of fixing enables the sheet aluminium and the copper pipe to expand and contract while holding their shape and full contact with each other so that heat can conduct efficiently with minimal loss. There is no welding, soldering or bonding used.



### Other Panels

Most panels use aluminium or copper absorber sheets but spot weld, solder or laser welded together from fins. The welding is a potential point of failure with the heat stresses. In addition the heat pipe is soldered, welded or laser welded to the absorber plate. The point of contact between the absorber and the heat pipe is only a few degrees. Over a period of time due to the heat collected on the absorber surface and the heating and contraction of the heat pipe and the absorber plates the heat pipe tends to become detached in places causing less heat to be transmitted to the heat pipe and the panel to perform less effectively and with less efficiency.



The Thermosolar absorber plate designed and manufactured for a long working life?

## The heat pipe should be of long working life

### Thermosolar panels

In the panel the heat pipe is a continuous copper pipe without joints (except at the two connections to the manifold pipe). This is a robust form of construction preventing leaks, weeps and avoiding liquid loss in the collector which tends to condense on the glazed surface, thus preventing optimum efficiency and over a period of time decaying the absorber surface.

### Other Panels

Most panels weld or solder a series of parallel heat pipes to the manifolds, creating the necessity for at least ten or twelve joints in the heat pipe to and from the manifold, making failure much more likely.



The Thermosolar heat pipe is designed to eliminate the possibility of leaks, using no joints and hence avoids liquid loss which could otherwise condense on the glazed surface. Such a system will have a longer working life.



Thermosolar Solar Panel

## The Panel absorber surface should be selectively coated with an environmentally friendly material

### Thermosolar panels

These are selectively coated (creating a series of microscopic ridges to present a greater surface area to the light) with Thermosolar's own formula aluminium oxide coating, which is designed to produce only useful heat for the application rather than to produce all possible heat. This coating is 100% safe.

### Other Panels

These are sometimes coated with black paint, which performs in hot direct sunshine conditions but not in cloudy light conditions or on cooler days. Some panels are selectively coated in black chrome. We at Thermosolar think this is an area of potential environmental danger as well as potential health risks.



Thermosolar surfaces are engineered to optimise the amount of useful heat the panel can produce for its application, with an environmentally friendly material. This helps produce heat when direct sunlight is not available (for example) and eliminates health risks associated with cheaper methods such as black chrome.

See US Environmental Protection Agency's note at:  
<http://www.epa.gov/ttn/atw/hlthef/chromium.html>



## The ability to stagnate without causing collector damage

The ability to hold heat stresses over a prolonged period of time. The owner of the collectors should be able to leave the property vacant and unattended knowing that the panels will safely stagnate and will not require covering in times of high isolation and low heat requirements. This overcomes the problem of having to “dump” the heat. Thermosolar panels are designed stagnate at 374 Fahrenheit (190 degrees Celsius) – in other words they will not get hotter than that regardless of isolation conditions.



Thermosolar panels are built and tested to stagnate without causing collector damage.



Thermosolar solar panels

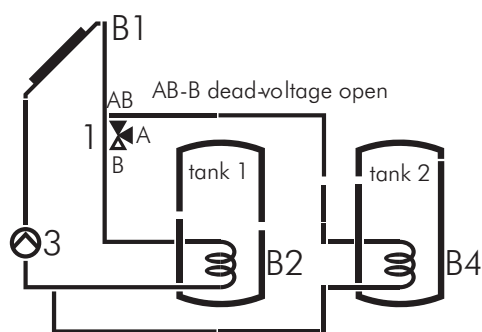


## The ability to produce controllable hot water

Thermosolar panels are controlled by the SR 14 or the SR 24 digital controller; this controller is installer programmable (to enable high efficiencies to be achieved by reflecting the end user's life style and living requirements) and by regulating the heat precisely. The SR 24 can divert heat to two separate hydraulic systems according to the installer's programmed requirements.



Thermosolar systems allow you to control the hot water produced to reflect the requirements of the end user and/or divert heat to separate systems.



Thermosolar Digital Controller SR 24

## Designed to avoid internal condensation issues

Many panels are permanently covered with condensation; while some condensation is inevitable Thermosolar panels are designed to remove any internal condensation within an hour of light striking the absorber surface making the panels last longer and work better.



Thermosolar panels are designed to avoid internal condensation issues.



## The ability to withstand high pressures and work at high pressures

In Thermosolar systems the heat circuit is pressurised to 65 pound per square inch. This means that the Glycol does not evaporate until the temperature of the heat circuit is in excess of 120 (248 F) degrees Celsius thus ensuring that in very hot daylight conditions all heat requirements will still be met. The heat circuit is a parallel-series connection, also known as Tichelmann system. This is a special system under which the heat pipes are connected both in series and in parallel ensuring that pressure is equally maintained in all parts of the system



Thermosolar systems are tested and certified to work at high pressures.





## How long is the guarantee from the manufacturer?

Thermosolar panels installed by an approved installer are guaranteed for 10 years and guaranteed against corrosion. For details of the all conditions attaching to the manufacturers' warranty please refer to the Installation, commissioning and maintenance instructions manual.



10 Year guarantee with the manufacturer.





## The connection design should be solid and easy to fit

The patented connection kits, which connect panel to panel and panel to the heat circuit are robust easy to fit and will last longer than brazing connections without leaks or weeps; these connections have been used in Europe in hundreds of thousands of systems over many years without any problems.



Panel Connections are designed to last and eliminate leaks or weeps.



### TS 300 Solar Panel -For mounting in portrait

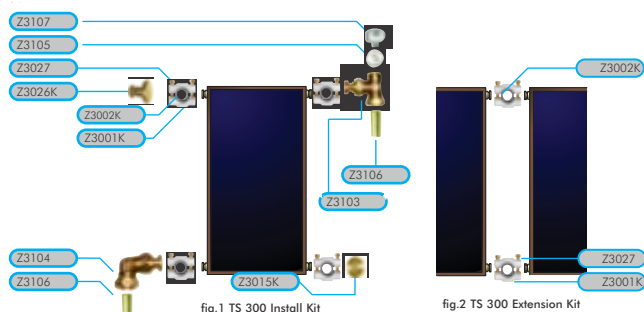


fig.1 TS 300 Install Kit

fig.2 TS 300 Extension Kit

### TS 300 panel -brown

K3134 GB

Description	Qty.	Ordering#
<b>Installation Kit</b> Z3100 GB		
Cap W (female)	1	Z3015K
Return connector	1	Z3104
Cap M with air vent	1	Z3026K
Connection clamps (pair) +1 spare	4 (5)	Z3001K
Stainless steel screws +2 spare	8 (10)	Z3027
Viton O-ring, black (17x3mm) +1 spare	4 (5)	Z3002K
Flow connector with air vent	1	Z3103
Air vent key	1	Z3107
Support sleeves 22mm	2	Z3106
Air bleed valve 1/2"	1	Z3105
Silicon grease	1	

### Extension Kit

Z3102 GB

Connection clamps (pair) +1 spare	2 (3)	Z3001K
Stainless steel screws +2 spare	4 (6)	Z3027
Viton O-ring, black (17x3mm) +1 spare	4 (5)	Z3002K

Thermosolar TS 300 Solar Panel Parts List p.02



### Frames

-Frames for vertical (portrait) mounted panels on a sloping roof

Description	Ordering#	Price
<b>Frames</b>		
<b>2 Panel On -roof (Shark Tail)</b> This frame is suitable for standard tile roof. The frame has a support pole with 4 shark tail brackets. This frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141AGB) is needed for installations using 3 or more panels.	K1052 GB	
<b>1 Panel On -roof Kit (Shark Tail) - Extension</b> This frame extension is needed for installing an additional single panel. The frame has a support pole with 2 shark tail brackets. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141AGB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1151 GB	
<b>2 Panel On -roof Kit Hook</b> This frame is suitable for roofs with standard or large tiles. The frame has 4 hook roof brackets. This frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141GB) is needed for installations using 3 or more panels.	K1082 GB	
<b>1 Panel On -roof Kit Hook - Extension</b> This frame extension is needed for installing an additional single panel. The frame has 2 hook roof brackets. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141GB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1081 GB	
<b>2 Panel On -roof Kit Slate</b> This frame is suitable for slate roofs. Frame has 4 combi screws. The frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141GB) is needed for installations using 3 or more panels.	K1056 GB	
<b>1 Panel On -roof Kit Slate - Extension</b> This frame extension is needed for installing an additional single panel. The frame has 2 combi screws. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141GB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1058 GB	
<b>2 Panel On -roof Kit Zinc</b> The frame is suitable for metal roofs. The frame has 4 special clamps. This frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141GB) is needed for installations using 3 or more panels.	K1084 GB	
<b>1 Panel On -roof Kit Zinc</b> This frame extension is needed for installing an additional single panel. The frame has 2 combi screws. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141GB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1086 GB	

Thermosolar TS 300 Solar Panel Parts List p.06

All extension kits, connection fittings and other parts are catalogued and available from Thermosolar

## There should be minimal maintenance requirements

There are no significant maintenance requirements; the panels are designed to be maintenance free and should last for over 35 years. In larger systems the glycol should be tested for anti-freeze properties every year. The testing can be carried out thru a pipe in the pump station without switching off the system by a suitably trained pool maintenance person.



Thermosolar systems require minimal maintenance, with the ability to offer zero downtime.



## The frames and other fittings should be strong light and easy to fit.

The frames are built of anodised Aluminium which is both strong and light and corrosion proof. They will not interfere with the integrity of the roof structure provided that the correct roof fitting is used; Thermosolar produce over 15 types of roof fittings so that tiles, slates, pan tiles, bitumen and flat roofs can all be quickly and safely fitted.



Frames and other fittings are easy to fit and cover the full spectrum of your install locations and roof types.



### Frames

-Frames for vertical (portrait) mounted panels on a sloping roof

Frames	Description	Ordering#
	<b>2 Panel On-roof (Shark Tail)</b> This frame is suitable for standard tile roof. The frame has a support pole with 4 shark tail brackets. This frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141AGB) is needed for installations using 3 or more panels.	K1052 GB
	<b>1 Panel On-roof Kit (Shark Tail) - Extension</b> This frame extension is needed for installing an additional single panel. The frame has a support pole with 2 shark tail brackets. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141AGB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1151 GB
	<b>2 Panel On-roof Kit Hook</b> This frame is suitable for roofs with standard or large tiles. The frame has 4 hook roof brackets. This frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141 GB) is needed for installations using 3 or more panels.	K1082 GB
	<b>1 Panel On-roof Kit Hook - Extension</b> This frame extension is needed for installing an additional single panel. The frame has 2 hook roof brackets. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141 GB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1081 GB
	<b>2 Panel On-roof Kit Slate</b> This frame is suitable for slate roofs. Frame has 4 combi screws. The frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141 GB) is needed for installations using 3 or more panels.	K1056 GB
	<b>1 Panel On-roof Kit Slate - Extension</b> This frame extension is needed for installing an additional single panel. The frame has 2 combi screws. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141 GB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1058 GB
	<b>2 Panel On-roof Kit Zinc</b> The frame is suitable for metal roofs. The frame has 4 special clamps. This frame is for even panel numbers (for example: arrays of 2,4,6,8 and 10 panels). A Frame Connector (K1141 GB) is needed for installations using 3 or more panels.	K1084 GB
	<b>1 Panel On-roof Kit Zinc</b> This frame extension is needed for installing an additional single panel. The frame has 2 combi screws. This frame is for odd panel numbers (for example: arrays of 3,5,7 and 9 panels). A Frame Connector (K1141 GB) is needed for connection of the 2 Panel On-roof Frame and 1 Panel Extension.	K1086 GB

Thermosolar TS 300 Solar Panel Parts List

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### Individual frame components

Frame Equipment	Description	Ordering#
	<b>Extension Rails</b> Extension rails used to increase the frame angle VST-500: Length 500mm = ca. 15° angle VST-750: Length 750mm = ca. 21° angle VST-1000: Length 1000mm = ca. 27° angle	K1242 GB K1243 GB K1244 GB
	<b>Frame Connectors</b> Frame connectors are suitable for connection of two on-roof mounted frames. Frames: K1081 GB, K1082 GB, K1061 GB, K1062 GB, K1055 GB, K1058 GB, K1056 GB, K2041 GB, K2051 GB, K2061 GB	K1141 GB
	<b>Frame Connectors</b> Frame connectors are suitable for connection of two on-roof mounted frames. Frames: K1051 GB, K1052 GB, K2021 GB	K1141A GB
	<b>Hook Roof Bracket</b> 1 Piece of hook roof brackets, for frames: K1081 GB, K1082 GB and K2031 GB	K1144 GB
	<b>Combi Screw</b> 2 pieces of combi screw per pack for frames: K1056 GB, K1058 GB and K1041 GB	K1245 GB
	<b>Wind clamp</b> Wind clamp -brown Wind clamp -Silver	K1040 GB K1042 GB
	<b>Shark tail roof bracket</b> 1 Piece of the shark tail bracket for frames: K1052 GB, K1151 GB and K2021 GB	K1143 GB

Thermosolar TS 300 Solar Panel Parts List

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A selection of frame kits by Thermosolar

The other components, such as heat exchangers pump stations and controllers should be built to the same high standards of engineering excellence as the panels

Thermosolar heat exchangers are built from cast iron with the internal parts in cupro-nickel which will not stain or be degraded by pool chemicals or salt water. The heat exchanger design is the same as used in many power boats.

The pump station prevents simple plumbing errors and its components are made from single pieces of brass drilled and engineered to the appropriate tolerances. Dials on the pump station enable the installer to see the status of a system at a glance. The pump station incorporates a high quality UL approved pump, flow adjuster and glycol draw off testing pipe; the system is filled through this pipe.



Thermosolar components are of the same high quality as the panels.



(Above) High-efficiency pumps in Thermosolar energy systems



(Right) The Thermosolar Heat Exchanger



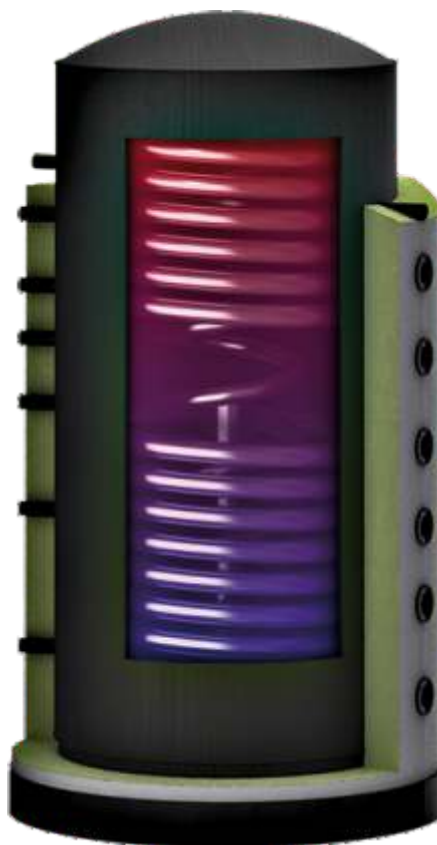
## Large capacity Tanks should be designed for solar systems

We offer a wide variety of solar system storage tanks.

- Buffer tanks - Compact unit designed with solar coil for auxiliary heating
- Buffer tanks with stratification tower - Compact design with internal stratification tower for enhanced solar performance
- Solar hot water tank - Long life steel tank with enamel coating
- Hygienic stratification tank - Highest performance capacities for all applications and demands
- Tank in tank - Combined hot water and heating buffer tank



Thermosolar high quality tanks - perfect for solar systems



## The heat exchange liquid should be “food safe”

Thermosolar systems are designed to be used with THESOL, a non toxic hygroscopic fluid based on mono-propylene glycol, used in food industries and water purification applications. It contains corrosion inhibitors, protecting the system and heat exchangers. It can be used in concentrations that protect against frost down to – 50 Celsius ( -58 F). The long-life OAT corrosion inhibitors are stable at high temperature. It also prevents any sludge building up in the heat pipe, unlike cheaper glycols.

In places where freezing is never experienced the heat pipe can be filled with a very low glycol concentration to enable the corrosion inhibitors to keep the system in optimum condition.



**The heat exchange liquid contains corrosion inhibitors, protects against frost and prevents the build up of sludge in the heat pipe.**



Thermosolar panels meet ISO 9806-1 and 9806-2 standards. Thermosolar is an ISO 9001 registered firm.

**EN 12 975 Parts 1 and 2**

Certified and independently tested to comply with BS EN 12975 Parts 1 & 2 and comply with all applicable official standards in the USA and Canada.

## Certification and Accreditation

The Thermosolar panels and systems are equally made to exact standards and meet ISO, European and Regional Certification. Operating in over 69+ Countries our panels have to meet precise standards and quality control. Our panels are made of high quality materials and not to be compared to cheaper manufactured panels, who often use plastic and materials that can degrade over time.

Thermosolar panels have a life expectancy of 35+ years.



**The Solar Keymark**  
CEN Keymark Scheme

## Thermosolar - exporting to 69+ Countries

Thermosolar is a leading manufacturer of solar thermal technology producing solar systems for water heating for the home and industry and solar pool heating systems. Thermosolar and its associated companies export solar systems in over 69 countries throughout the world. Thermosolar solar panels are used for domestic water heating, space heating, industrial heating processes and agricultural heating processes as well as for heating swimming pools of all shapes and sizes.

Using the limitless energy contained in natural light Thermosolar offers a non polluting way of creating energy without creating emissions. Thermosolar use German engineering to create very high quality durable long lasting solar systems which are certified to meet all applicable standards in the European Union, the United States of America and Canada.



Every year Thermosolar solar systems save tens of thousands of tonnes of carbon dioxide emissions.

For a green future.®



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