

Grant Solar Thermal Systems

On-Roof, Flat Roof and In-Roof Systems

Installation & User Instructions



Part No. DOC 73. Rev. 04 April 2013

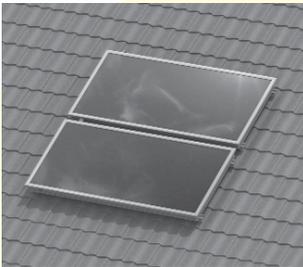


System Options

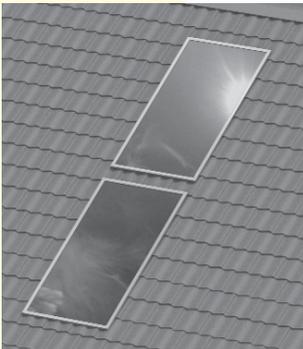
On-Roof



Portrait (side by side)

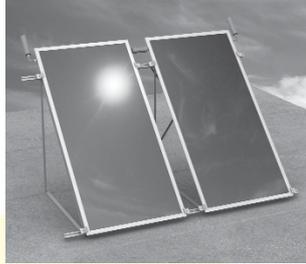


Landscape (one above other)

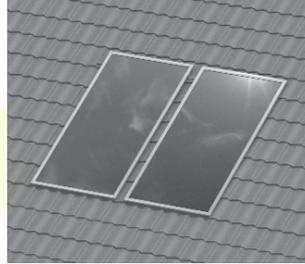


Portrait (one above other)

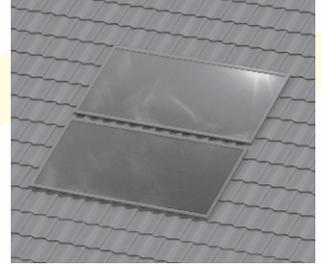
Flat Roof



In-Roof



Portrait (side by side)



Landscape (one above other)



Landscape (side by side)

Grant solar collectors are slender in appearance and are extremely durable with an extruded Aluminium frame and 3.2mm thick low iron glass.



Grant Sahara

with a Bronze anodized frame, this blends with most domestic roof types, providing an aesthetically pleasing appearance.

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1 General

The following information is a step-by-step guide to the installation and operation of the Grant Solar Thermal system.

1.1 Product Description

The Grant Solar Thermal system uses flat plate solar collectors that can be fitted in either a 'portrait' or 'landscape' configuration and offers three different mounting methods – 'On-roof', 'In-roof' and 'Flat-roof'.

The 'On-roof' and 'In-roof' mounting kits are designed for use on roof slopes of between 20° and 65° and must be installed in accordance with these instructions.

The 'Flat-roof' mounting kit can be used on any flat surface capable of carrying the weight of the collectors and any dead weighting used.

In-Roof Systems only:

A waterproof membrane must be used on all roofs. On older roofs the sarking felt is acceptable but if this is not present, then a breathable waterproof membrane must be fitted and it should end at the eaves (roof guttering).

Short term damp can occur beneath the roof covering (tiles or slates) on roof slopes of less than 20° or greater than 65°, or where there are long rafters or joined roofs, as a result of extreme weather conditions (e.g. driving rain, snow covering or ice formation). This can be avoided by using additional wedge section sealing strips. However, adequate ventilation of the roof must still be provided.

Installation kits for 'On-roof' installations are supplied with roof anchors to suit the type of roof covering concerned – i.e. profile tiles, flat tiles or slates. This must be specified when the kit is ordered. Before commencing installation check that the roof anchors supplied are correct for the roof type. If the height of profile tiles is particularly high a special adjustable height roof anchor is available. Contact Grant for details.

If necessary, the installation can be modified to suit the site conditions. However, any changes must be approved by Grant and must meet Building Regulations, codes of practice, and any relevant local bylaws and regulations in force at the time. Failure to comply with this will invalidate the product warranty.

1.2 Package Contents

Solar collectors, fixing components and other system accessories must be handled with care during storage and transport. If the packaging is damaged during transit this must be immediately reported to the supplier/delivery driver.

Before starting installation check the kit supplied contains all the required components. Refer to Section 2.1.

All packing materials must be disposed of appropriately after installation.

1.3 Format of installation instructions

These instructions describe the installation of collectors in both the 'portrait' and 'landscape' format using all three mounting types – 'On-roof', 'Flat roof' and 'In-roof'. This is covered in Sections 4, 5 and 6 respectively.

The actual fitting of the collectors and the connection to the hydraulic solar circuit is identical for all the above mentioned mounting options, and is covered in Sections 7 and 8 respectively.

1.4 Safety Instructions and Symbols

When installing the system, take note of the safety instructions in this document. The symbols used in the text are explained below:



Caution:

This symbol draws attention to a potential hazard!



Note:

This symbol indicates useful information or a general note.

1.5 Safekeeping of the Installation Instructions

These Installation & User Instructions must be handed over to the householder on completion of the installation. They should be kept for future reference as necessary.

1.6 Installation

Installation must be carried out by a competent installer in compliance with all current local planning requirements, Building Regulations, codes of practice, Health and safety legislation, and any relevant local bylaws and regulations in force at the time.

All electrical installation work must be carried out by a qualified electrician. All wiring and earth bonding must comply with current IEE wiring regulations.

In-roof and On-roof installations only:

When installed, both the In-roof and On-roof systems can experience uplift due to the wind. When installing either system ensure that the collectors are installed no less than THREE tiles from any roof edge.

Important:

All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the solar primary circuit.

Plastic pipe must NOT be used for any part of the solar primary circuit.

All internal solar primary system pipework should be insulated using suitable high temperature resistant pipe insulation.

1.7 Lightning Protection

In most cases the number of thunder-storm days per year for a given installation location in the UK does not reach a level at which specific protective measures need to be applied to solar thermal collectors.

However where a building or structure is considered to be at greater risk, e.g. with very tall buildings or buildings in exposed locations, the designer of the solar thermal system to be fitted to that building, along with the designer of the building electrical system, may choose to design or apply protective measures such as installation of conductive air rods or tapes.

If the building is already fitted with a lightning protection system (LPS), then a suitably qualified person should be consulted as to whether, in this particular case, the solar collector(s) and their associated mounting frame, should be connected to the LPS, and if so what size conductor should be used for this purpose.

Where an LPS is fitted, solar thermal components should be mounted away from lightning rods and associated conductors insofar as is reasonably practicable (see BS EN 62305).

Where there is a perceived increase in the risk of a direct lightning strike, as a consequence of the installation of the solar thermal system, a specialist in lightning protection should be consulted with a view to installing a separate lightning protection system in accordance with BS EN 62305.

Note: It is generally accepted that the installation of a typical roof-mounted “domestic” solar thermal system presents a very small increased risk of a direct lightning strike.

1.8 Equipment and Materials to be provided

General:

- Heat conducting paste - for temperature sensors (optional)

On-roof Installation:

- 2 ‘Grant’ lead flashings or 2 ‘Solardek’ flashings or 2 vent tiles (see Section 9)
- Fixing screws for fixing battens/roof anchors

Flat roof installation:

If the supporting frame is secured by weights rather than being screwed down, the weights must conform to the following specifications for a wind pressure zone up to 8 m building height and a snow load zone up to 0.75 kN/m² (Table 1).

Table 1: Dead Weight Requirements

Flat Roof installation	Up to 8m
1 solar collector	290 kg
2 solar collectors	580 kg
3 solar collectors	870 kg
4 solar collectors	1160 kg
5 solar collectors	1450 kg

As weights, lawn edge stones can be used, for example.

Permissible roof load must not be exceeded under any circumstances, and if necessary a structural engineer must be consulted beforehand. If the substructure has been penetrated, it must be carefully re-sealed in accordance with technical standards.

In-roof Installation:

- Fixing screws for mounting battens

1.9 Tools Required

On-roof and Flat roof installations:

- Screwdriver (6mm hexagon socket)
- Pencil
- Tape measure or folding rule
- 17/19mm open-jaw spanners (x2)
- 13mm open-jaw spanner
- Screwdrivers (standard and cross-head)
- Electric screwdriver/drill

In-roof installation:

- Pencil
- Tape measure or folding rule
- 2 open-jaw spanners 17/19mm
- 1 open-jaw spanner 13/14mm
- Screwdrivers (standard and cross-head, sizes 2 and 3)
- Socket wrench with T-handle, size 6
- Electric screwdriver with socket bit for sealing screw (8mm hexagon)
- Hammer
- Solar collector carrying handles
- Torx T25 screwdriver

Commissioning:

- Filling station
- Pressure gauge
- Screwdriver (flat bladed)

1.10 Standards and Approvals

Grant flat plate solar collectors conform to the requirements of BS EN 12975 Thermal solar systems and components – Solar collectors, and have the ‘Solar Keymark’ approval.

1 General

1.11 Technical Specification - Collectors

Collector Specification	
Collector type	Flat plate
Frame material	Aluminium
Frame finish	Bronze anodised
Glass type	ESG, Durasolar P+ Sandy
Glass thickness	3.2mm
Overall dimensions (h x w x t)	2043mm x 1143mm x 80mm
Weight (empty)	40kg
Solar fluid content	1.6 litres
Gross area	2.34 m ²
Aperture area	2.14 m ²
Absorber area	2.14 m ²
Maximum operating pressure	10.0 bar
Stagnation temperature*	177°C
Snow loading - maximum	≤ 3.6 kN/m ²
Wind loading - maximum	≤ 1.0 kN/m ²
Tilt angle - minimum	20°
Tilt angle - maximum	90°
Pressure drop (at 2.5 l/min Solar fluid)	105 mbar
Zero loss collector efficiency (based on aperture area) η_{0a}	0.826 (82.6%)
Linear heat loss coefficient (based on aperture area) U_{1a}	4.441
Effective thermal capacity C_{eff}	12620 kJ/m ² K

*Test conditions – Irradiance 1000W/m² Ambient temperature 30°C

2 Package Contents

2.1 Standard Installation Kits

For 'On-roof and 'Flat roof' Installations (in portrait format)

Table 1: Installation Kit Contents

Article	Standard 1 Collector Kit	Standard 2 Collector Kit	Standard 3 Collector Kit	Standard 4 Collector Kit	Standard 5 Collector Kit
Mounting rail	extension kit only	2	2 (plus extension kit)	4	4 (plus extension kit)
Mounting hook	2	4	6	8	10
Cylinder bolt	4	8	12	16	20
Fixing bracket	4	8	12	16	20
Anchor block	4	8	12	16	20
Collector flow/return pipe c/w insulation	2	2	2	2	2
Collector to collector connector c/w insulation	0	1	2	3	4
Installation and operating instructions	1	1	1	1	1
On-Roof installation					
Roof anchor*	4	6	8	10	12
Flat Roof installation					
Flat roof angle frame	2	3	3	4	5
Securing cruciform kit	1	1	1	1	1

* Roof anchor - to suit type of roof covering (see pages 14 to 17) - Slate - Flat tile - Profile tile

For 'In-roof' Installations (in portrait format)

Table 2: Installation Kit Contents

Article	Standard 1 Collector Kit	Standard 2 Collector Kit	Standard 3 Collector Kit	Standard 4 Collector Kit	Standard 5 Collector Kit
Mounting bracket	4	8	12	16	20
Anchor block	4	8	12	16	20
Collector flow/return pipe c/w insulation	2	2	2	2	2
Collector to collector connector c/w insulation	0	1	2	3	4
Cylinder bolt	4	8	12	16	20
Side gutter LH	1	1	1	1	1
Side gutter RH	1	1	1	1	1
Base tray – lower section**	1	2	3	4	5
Base tray – upper section**	1	2	3	4	5
Cover strip	2	3	4	5	6
Bottom apron flashing 1-piece***	1	0	0	0	0
Bottom apron flashing LH***	0	1	1	1	1
Bottom apron flashing RH***	0	1	1	1	1
Bottom apron flashing Intermediate***	0	0	1	2	3
Bottom flashing 1-piece****	1	0	0	0	0
Bottom flashing LH****	0	1	1	1	1
Bottom flashing RH****	0	1	1	1	1
Bottom flashing Intermediate****	0	0	1	2	3
Top cover flashing 1-piece	1	0	0	0	0
Top cover flashing LH	0	1	1	1	1
Top cover flashing RH	0	1	1	1	1
Top cover flashing Intermediate	0	0	1	2	3
Closure strip	0	1	2	3	4
Fixing screw	14	28	44	60	76
Clip c/w nail	12	12	12	12	12
Foam draught seal wedge	6	6	6	6	6
Foam draught seal block	2	3	4	5	6
Mastic bead (roll)	1	1	1	1	1
Torx screwdriver bit (T25)	1	1	1	1	1
Installation and operating instructions	1	1	1	1	1

** Maybe supplied as one tray *** Bottom apron flashing used for tiles only **** Bottom flashing used for slates only

Table 3: Timber Battens (to be supplied by the installer) – minimum lengths (mm)

Bottom batten (30 x 50)	1460	2645	3835	5025	6215
Lower middle batten (30 x 90)	1460	2645	3835	5025	6215
Upper middle batten (30 x 90)	1460	2645	3835	5025	6215
Top batten (30 x 50)	1460	2645	3835	5025	6215

3 Dimensions & Fixing Intervals

3.1 On-roof Installation

Position of Roof Anchors and Mounting Rails

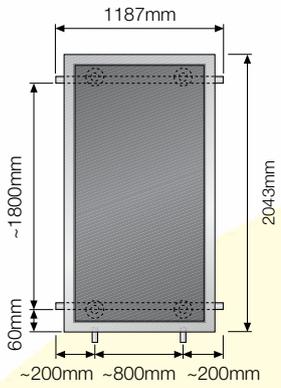


Figure 1: 1 collector (portrait)

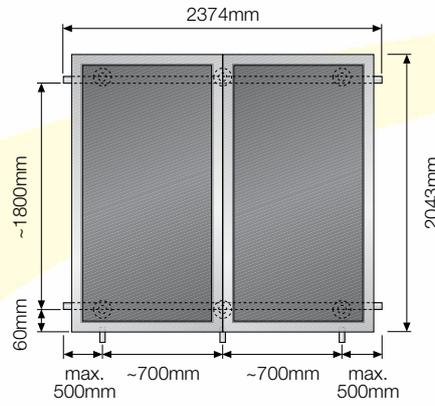


Figure 2: 2 collectors (portrait)

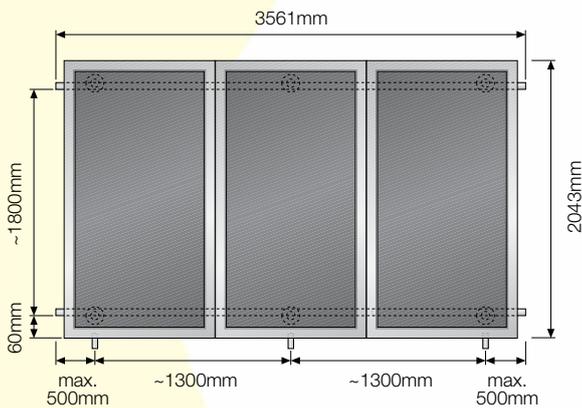


Figure 3: 3 collectors (portrait)

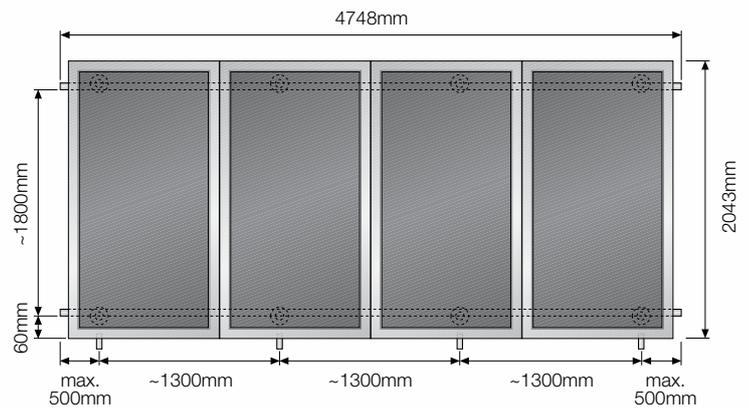


Figure 4: 4 collectors (portrait)

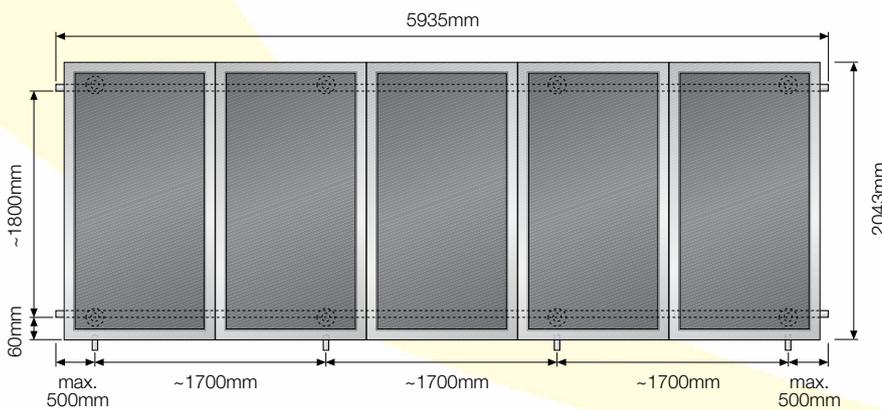


Figure 5: 5 collectors (portrait)

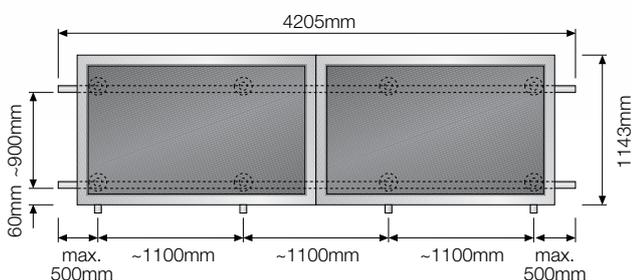


Figure 6: 2 collectors (landscape)

3.2 Flat-roof Installation

Position of Roof Anchors and Mounting Rails

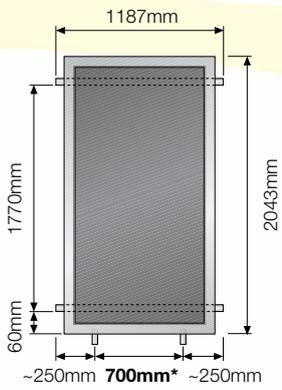


Figure 7: 1 collector (portrait)

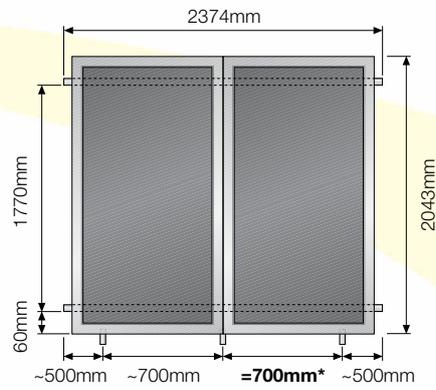


Figure 8: 2 collectors (portrait)

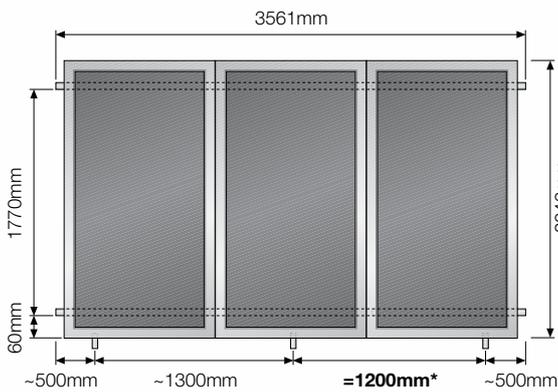


Figure 9: 3 collectors (portrait)

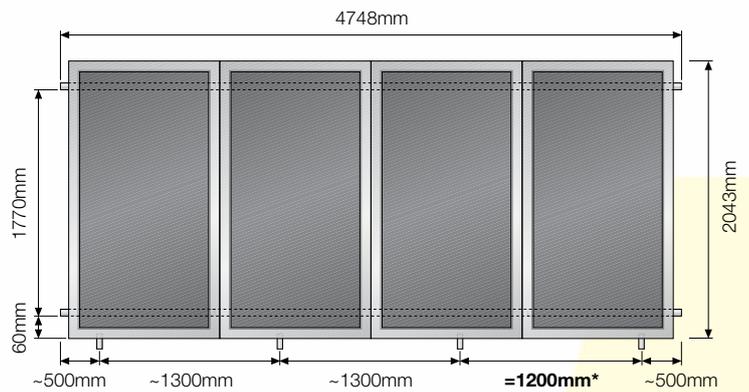


Figure 10: 4 collectors (portrait)

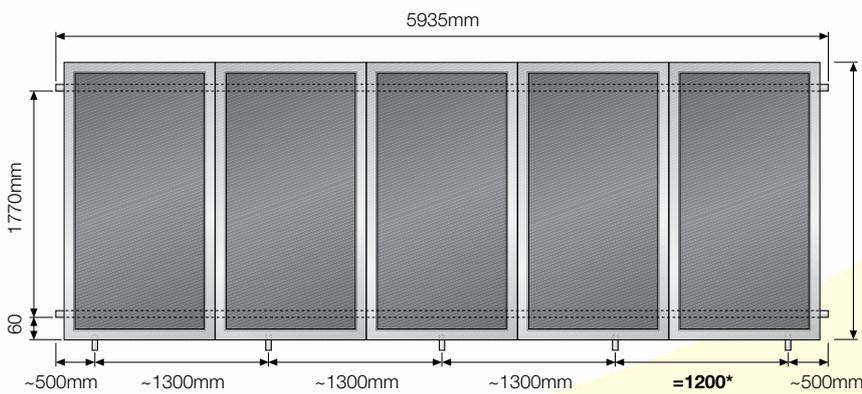
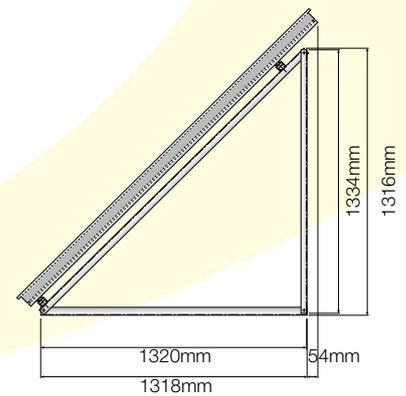


Figure 11: 5 collectors (portrait)



* This is a fixed dimension and must be as shown above

3 Dimensions & Fixing Intervals

3.3 In-Roof System Installation

Position of Mounting Rails

1-5 Solar Collectors, Vertical, Side by Side

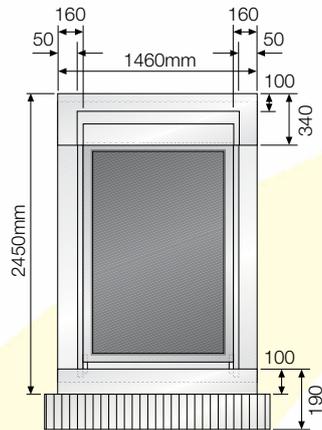


Figure 12: 1 collector (portrait)

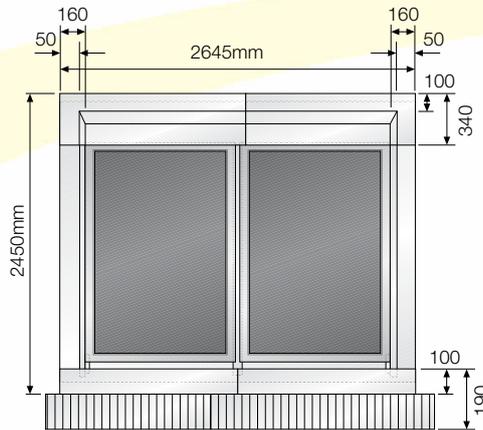


Figure 13: 2 collectors (portrait)

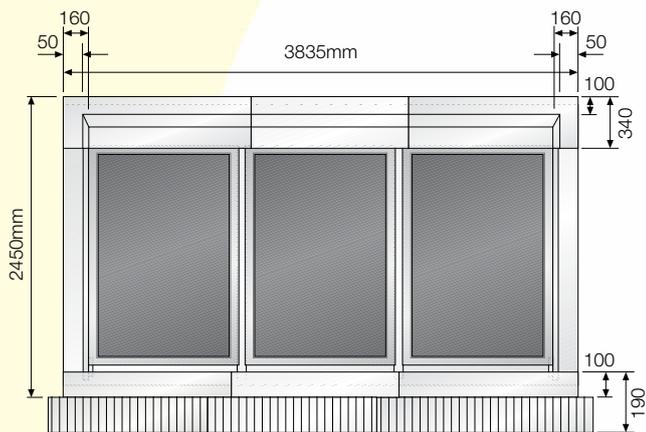


Figure 14: 3 collectors (portrait)

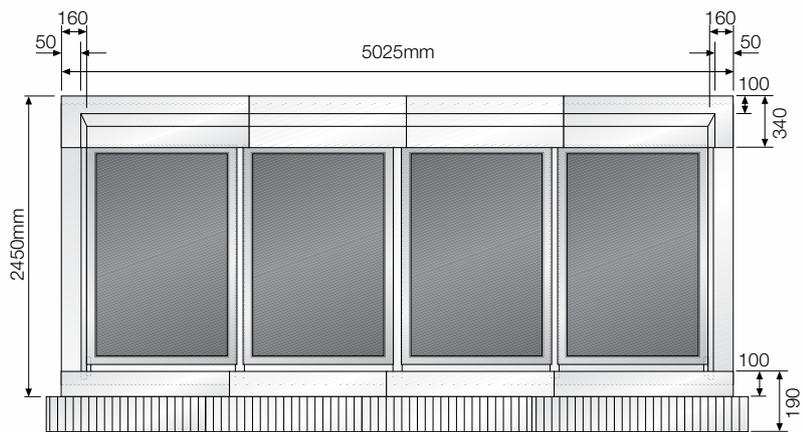


Figure 15: 4 collectors (portrait)

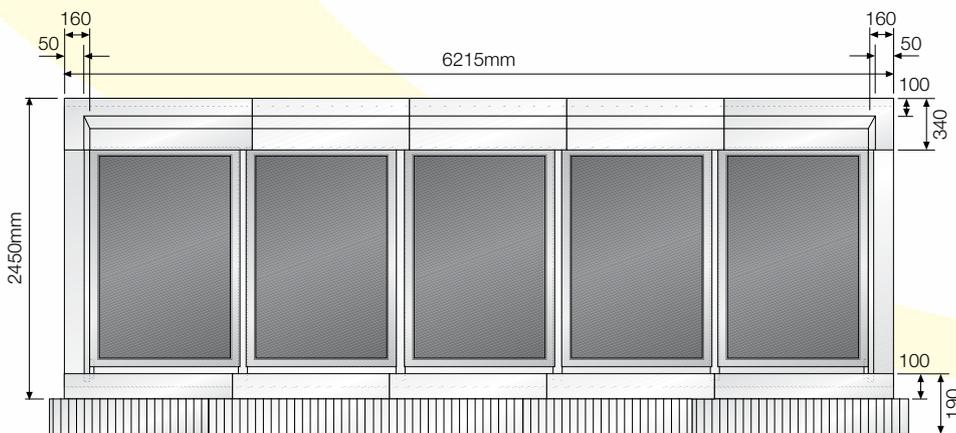


Figure 16: 5 collectors (portrait)

3.3 In-Roof System Installation

Position of Mounting Rails

1-5 Solar Collectors, Horizontal, Side by Side

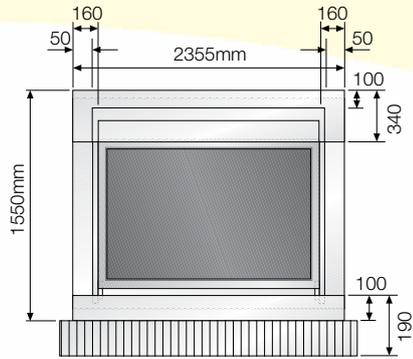


Figure 17: 1 collector (landscape)

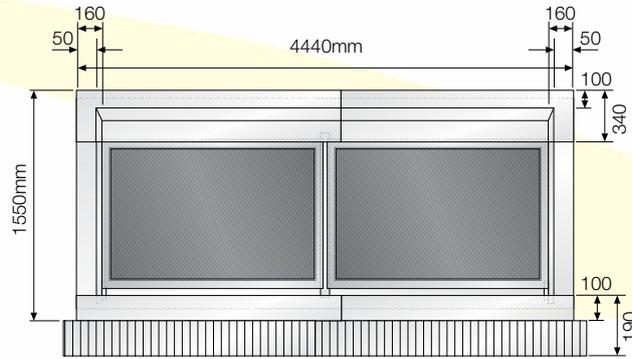


Figure 18: 2 collectors (landscape)

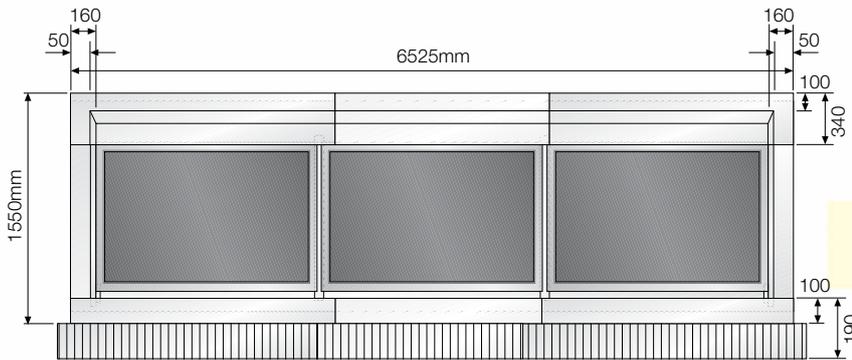


Figure 19: 3 collectors (landscape)

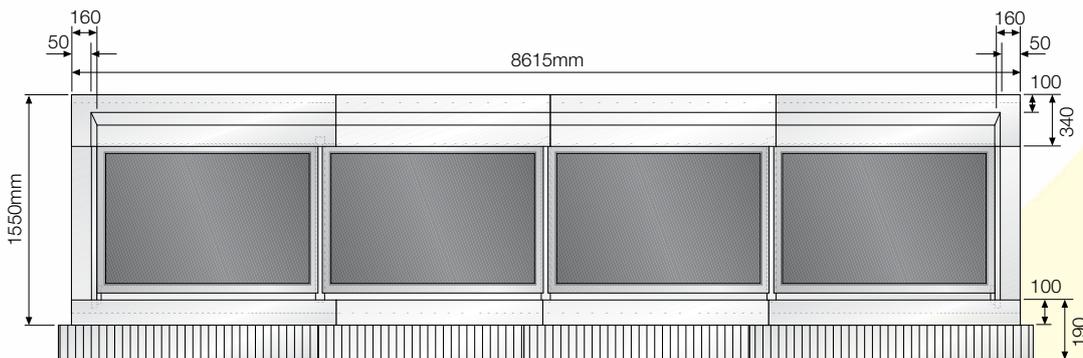


Figure 20: 4 collectors (landscape)

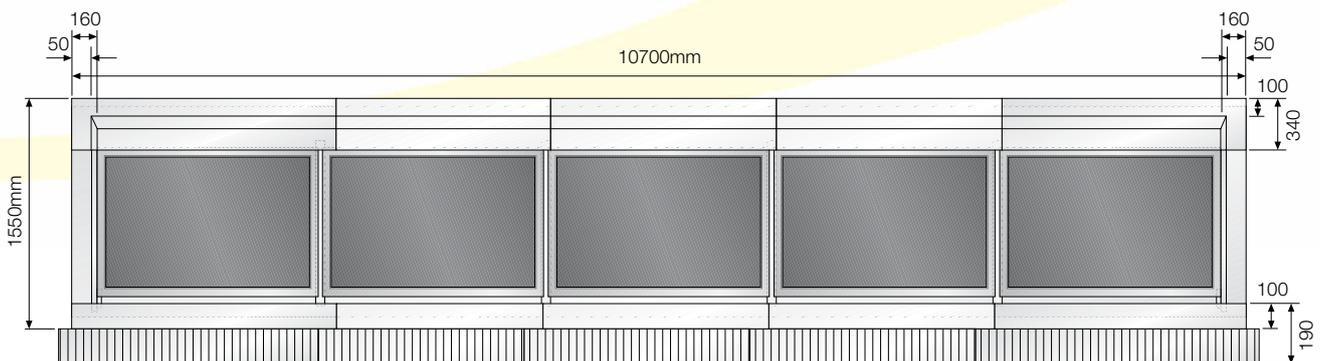
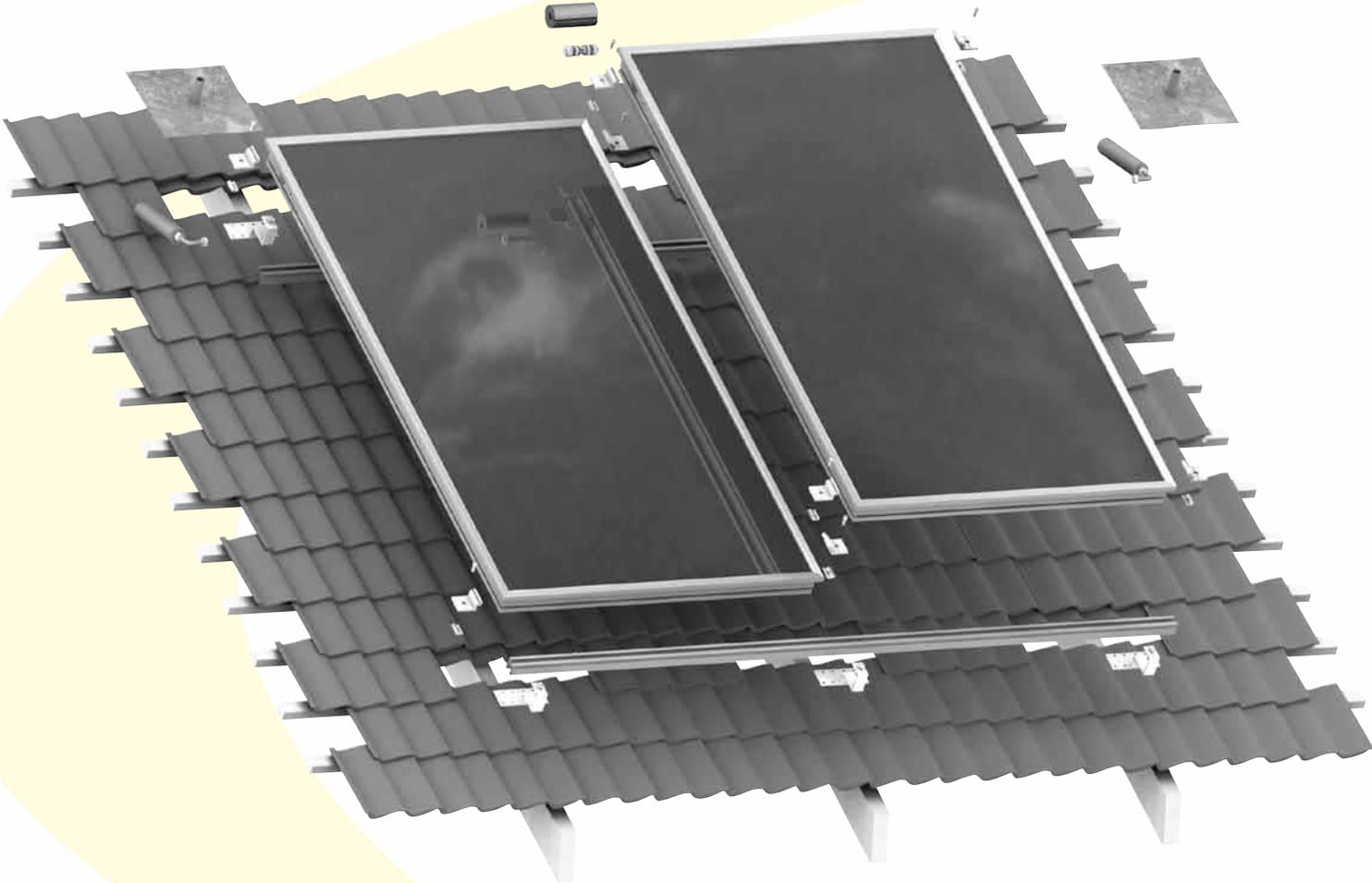


Figure 21: 5 collectors (landscape)

Note: Dimensions include cover frame

4 On-Roof System Installation

See Section 9 for details of roof penetrations.



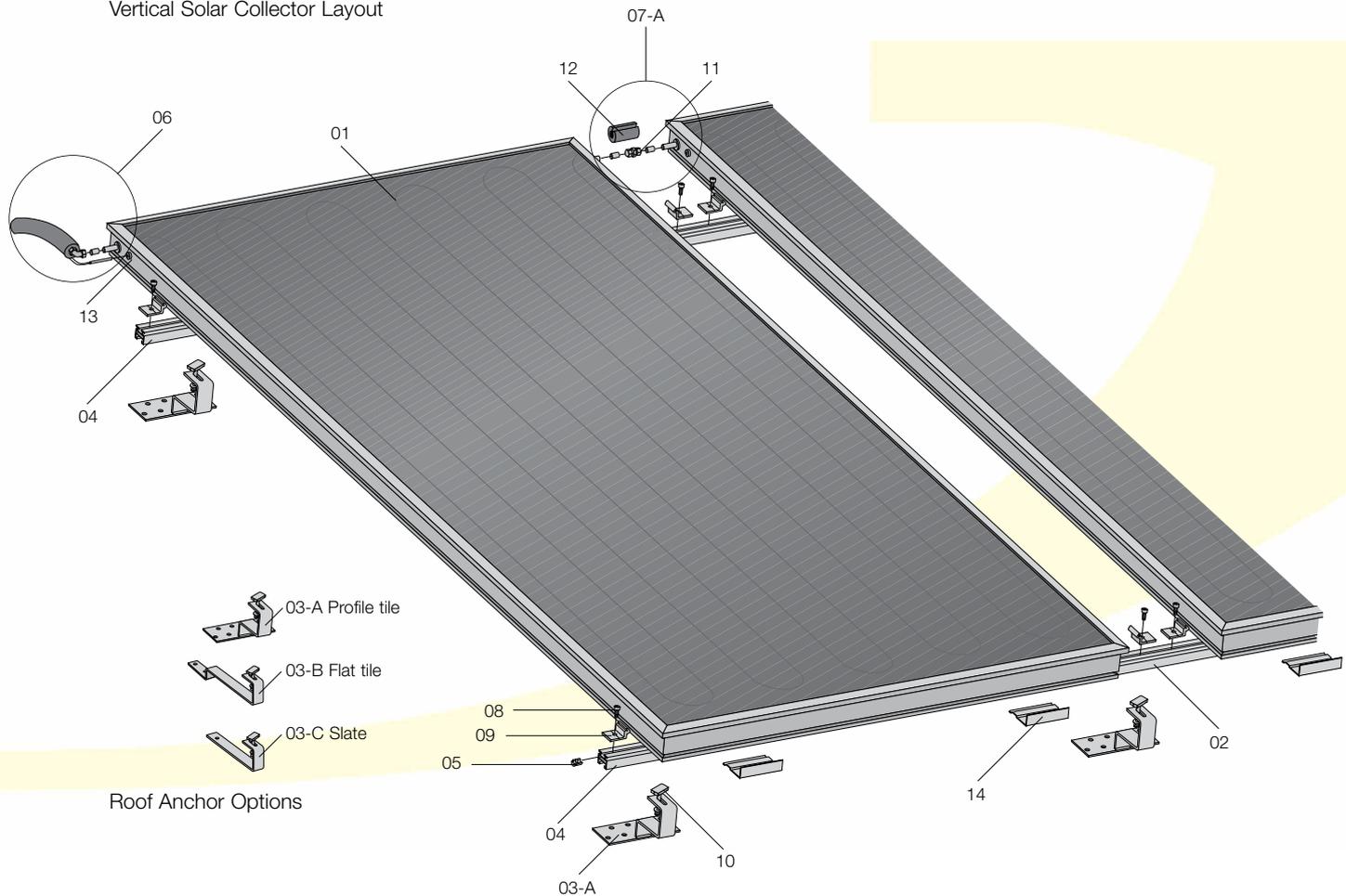
4.1 Installation Summary

The standard installation kit allows solar collectors to be fitted vertically onto horizontal mounting rails.

Mounting rails are fixed to the roof structure using the appropriate type of roof anchors for the roof covering - e.g. slates, flat tiles or profile tiles.

Item	Description
01	Collector
02	Mounting rail set
03	Roof Anchors - A profile tile B flat tile C slate roof
04	Rail profile
05	Anchor block
06	Collector connection kit
07	Collector to Collector connection kit
08	Cylinder anchor bolt
09	Fixing Bracket
10	Interlocking bolt
11	Hydraulic connection
12	Insulation
13	Temperature sensor
14	Mounting hooks

Figure 22: Installation Summary, Vertical Solar Collector Layout



4 On-Roof System Installation

4.2 Profile Tile

Roof Anchors fixed to Rafters

1. For profile concrete tiles, these roof anchors are attached directly to the roof rafters (rafter-mounted installation).

Caution:

Never attach safety harness to the installation system!

2. Expose the installation area above the rafters. For roof anchor intervals, see Page 8, 3.1 On-Roof System installation.

Note:

As a rule, pushing up the roof tiles is sufficient. Horizontal positioning of roof anchors is dependent on the rafters and the tile valleys.

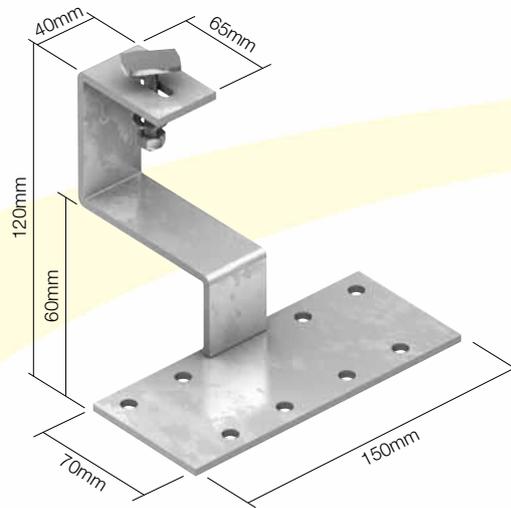


Figure 23: Dimensions of Roof Anchor A

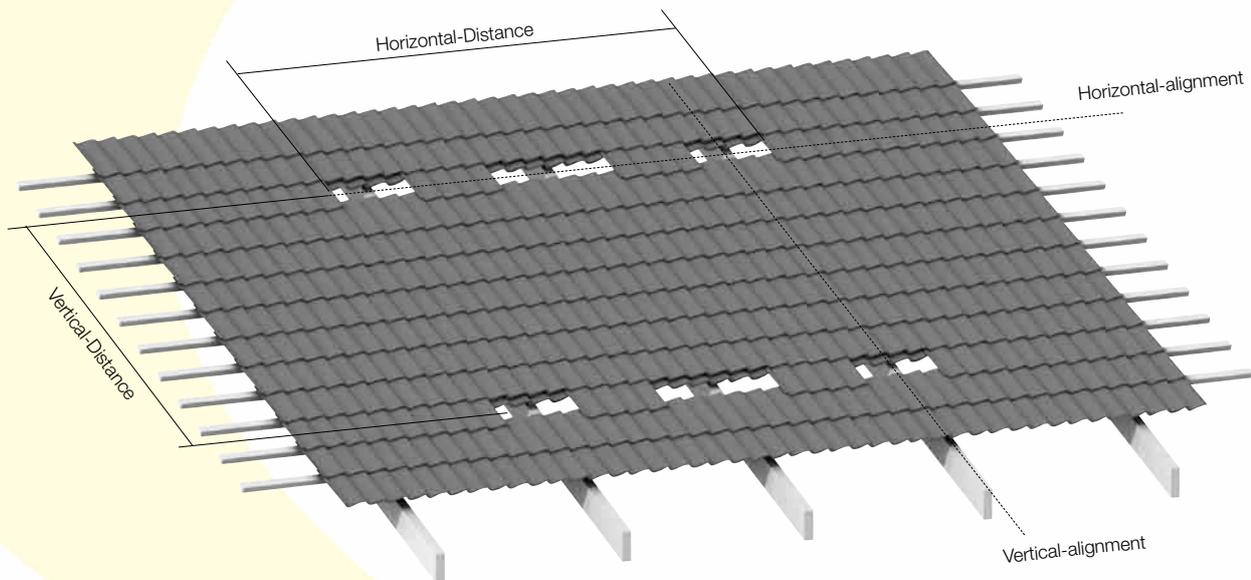


Figure 24: Horizontal and Vertical Alignment

3. Place roof anchor (03-A) in line with the top edge of the roof tile in the tile valley. Fix the base plate of the roof anchor to the rafter with screws (16).
4. Fix all further roof anchors in the same way. For roof anchor intervals, see Page 8, 3.1 On-Roof System installation.

Note:

Roof anchors must be horizontally and vertically aligned (follow roof tile valleys).

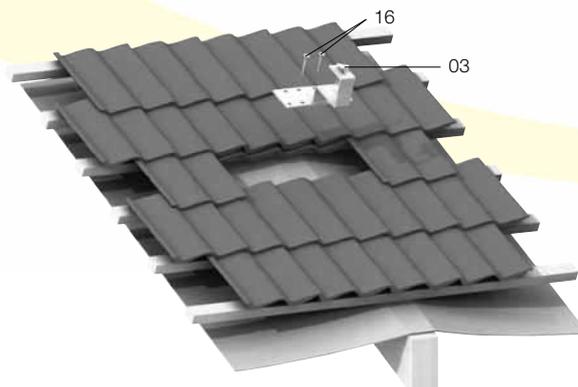


Figure 25: Installation of Roof Anchors A

4.3 Flat Tile

Roof Anchors fixed to Rafters

1. For flat concrete tiles, these roof anchors are attached directly to the roof rafters (rafter-mounted installation).

Caution:

Never attach safety harness to the installation system!

2. Expose the area above the rafters. For roof anchor intervals, see page 8, 3.1 On-Roof System.

Note:

As a rule, pushing up the roof tiles is sufficient. Horizontal positioning of roof anchors is dependent on the rafters and the tile valleys.

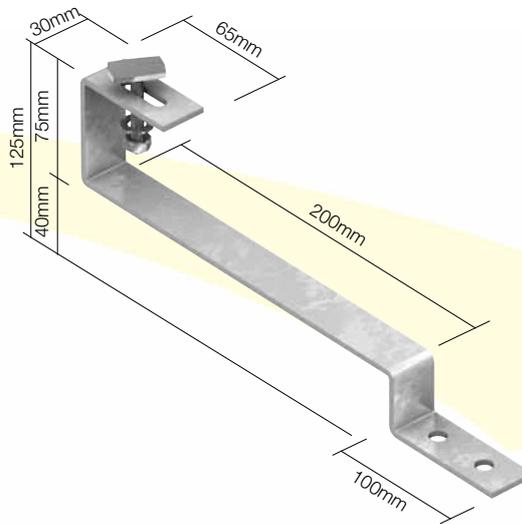


Figure 26: Dimensions of Roof Anchor B

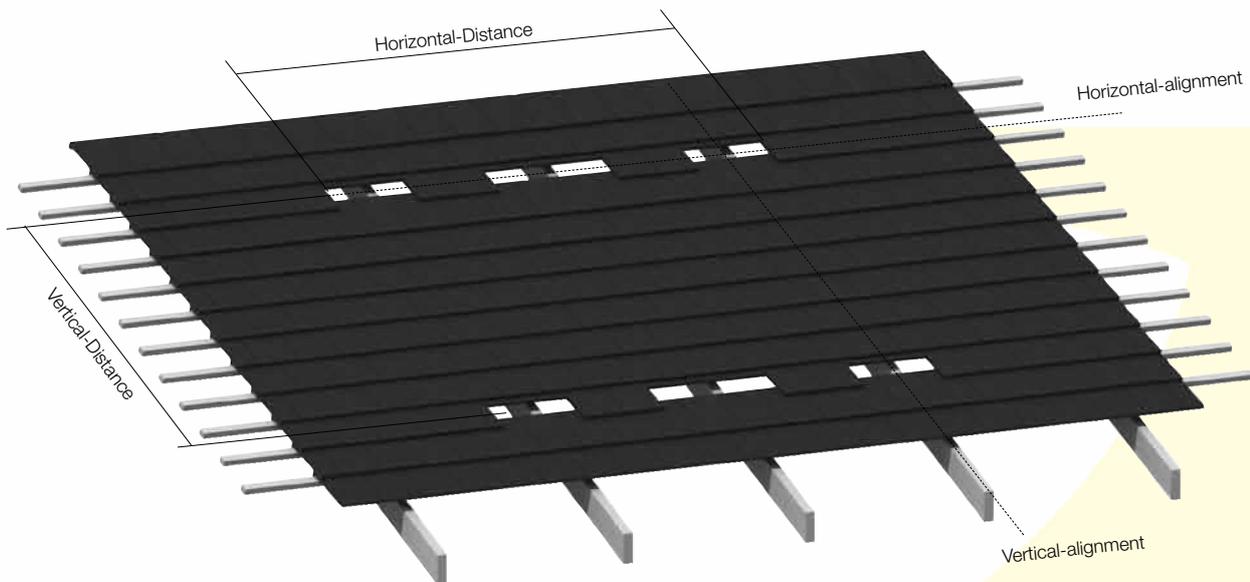


Figure 27: Horizontal and Vertical Alignment

3. Place roof anchor (03-B) in line with the top edge of the roof tile. Fix the roof anchor to the rafter with screws (16).
4. Fix all further roof anchors in the same way. For roof anchor intervals, see Page 8, 3.1 On-Roof System installation.

Note:

Roof anchors must be horizontally and vertically aligned (follow roof tile valleys).

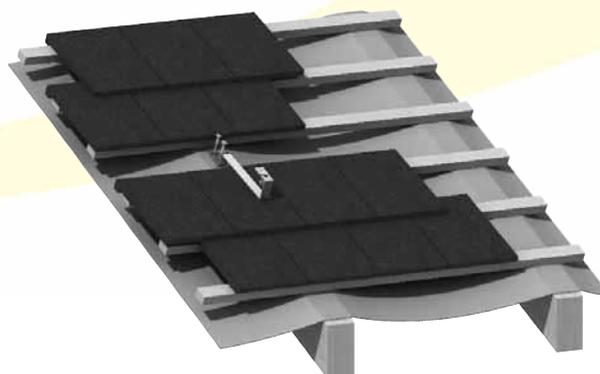


Figure 28: Fixing Mounting Battens and Roof Anchors

4 On-Roof System Installation

4.4 Slate Tile

Roof Anchors fixed to Rafters

1. On slate roofs, additional mounting battens are fixed to the roof substructure. Roof anchors 'C' are fixed through the slate tiles to the mounting batten (batten-mounted installation).

Caution:

Never attach safety harness to the installation system!

2. Expose the area required for installation (length of mounting batten). For roof anchor intervals, see Page 8, 3.1 On-Roof System installation.

Note:

As a rule, pushing up the roof slates is sufficient. Horizontal positioning of roof anchors is dependent on the rafters and the tile valleys.

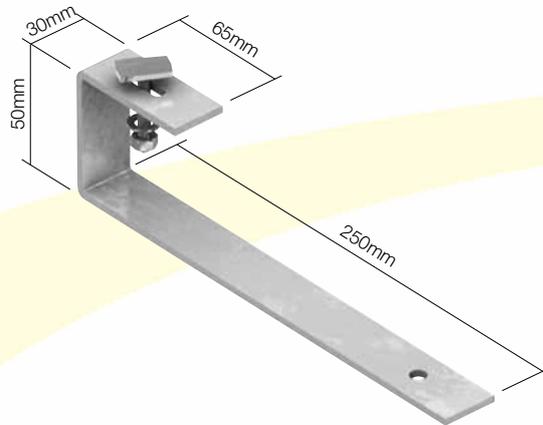


Figure 29: Horizontal and Vertical Alignment

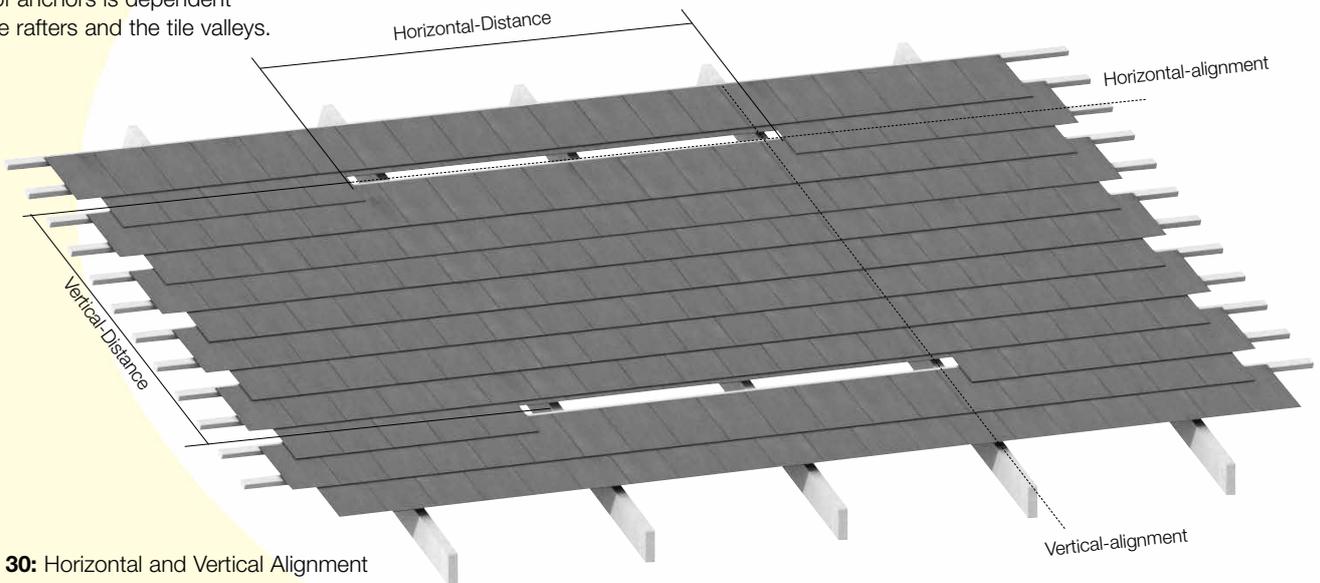


Figure 30: Horizontal and Vertical Alignment

3. Mounting battens (18) are fixed with screws to the rafters at a distance of 185mm from the roof batten below.

Note:

The distance of 185mm is dependent on the roof anchor and type of roofing and must be modified if necessary.

4. Place the roof anchor (17) on to the slate tile and mounting battens and fix with screws (16).
5. Fix all further roof anchors in the same way. For roof anchor intervals, see Page 8, 3.1 On-Roof System installation.

Note:

Roof anchors must be horizontally and vertically aligned.

Note:

If roof is fully sarked (timber boards) then mounting anchors should be screwed through sarking into the rafters below.

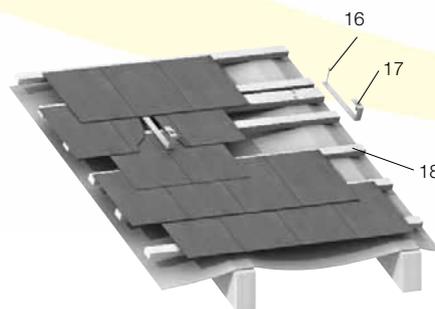


Figure 31: Fixing Mounting Battens and Roof Anchors

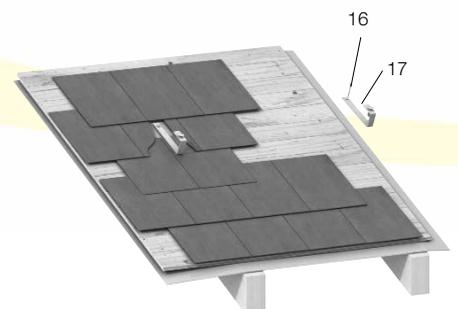


Figure 32: Fixing Mounting Battens and Roof Anchors through Sarking

4.5 Alignment and Fixing of Mounting Rails

1. Close the roof covering at the top and bottom.
2. Fix top mounting rail (04) to the roof anchor (03).

Position the heads of interlocking bolts (10) parallel to the mounting rail (04) and place them on the mounting rail, push the interlocking bolts to the top in the roof anchor (03) and secure with a 90° turn. Tighten the nuts of the interlocking bolts (hand tight). Use serrated washers to secure the nuts.

Install all further mounting rails in the same way.

3. Align the mounting rails horizontally and vertically so that the rails and the roof tiles are parallel. Diagonal dimensions between mounting rails must be equal:
 $D1 = D2$

Tighten the nuts on the interlocking bolts.

Installation of solar collectors:
 See pages 33 to 35.

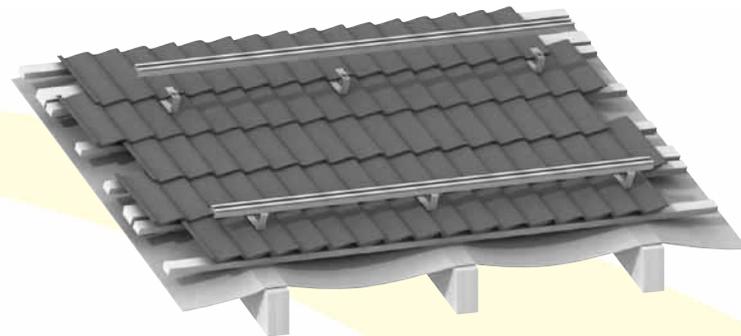


Figure 33: Roof Covering with Roof Anchors

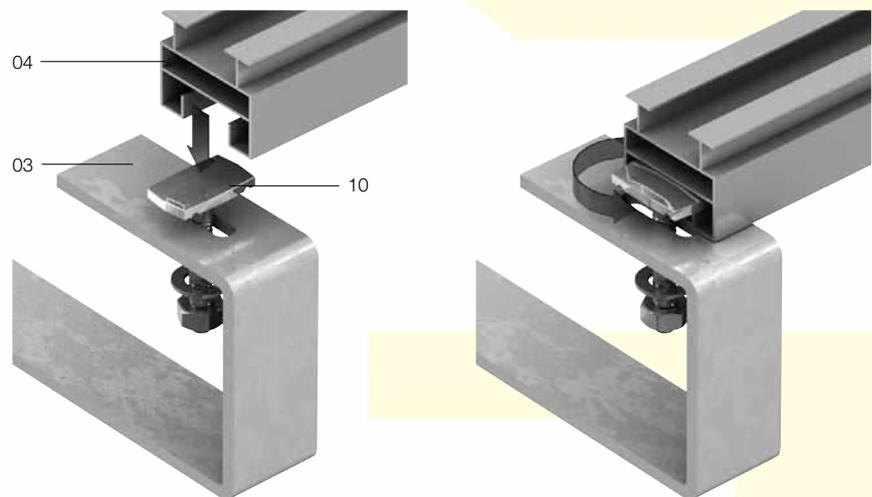


Figure 34: Fixing the Mounting Rail

4.6 Joining Mounting Rails

1. On some installations it may be necessary to join two or more sections of mounting rail to create a longer length of rail.
2. Join the sections of rail using the screws and fishplates (supplied in the fixing kit provided), as follows:

Fit the fishplate into the rectangular opening at the end of the one section of mounting rail. Refer to Figure 36.

Align the threaded hole in the fishplate with the hole in the rail (50mm from the rail end), fit the cylinder bolt provided and tighten to secure. Refer to Figure 37.

Fit the exposed end of the fishplate into the rectangular opening of the second mounting rail. As before, align the threaded hole of the fishplate with the hole in the rail, fit the cylinder bolt and tighten to secure the second rail section to the first. Refer to Figure 38.

Repeat this process for all other connections between mounting rail sections.

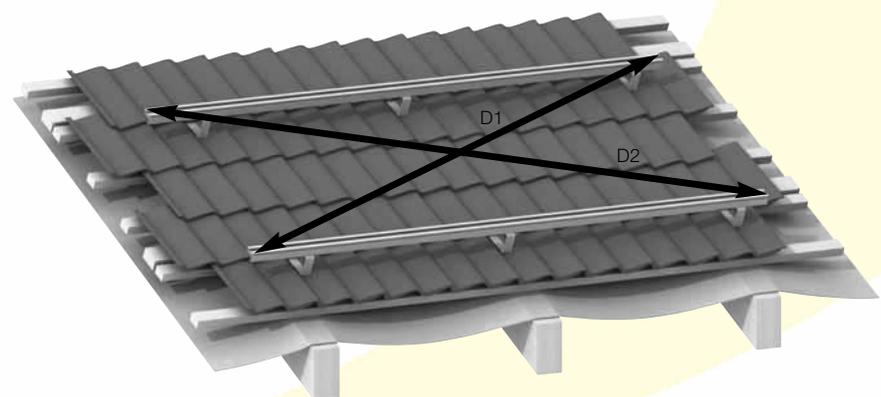


Figure 35: Aligning the Mounting Rail



Figure 36: Installing the Fishplate



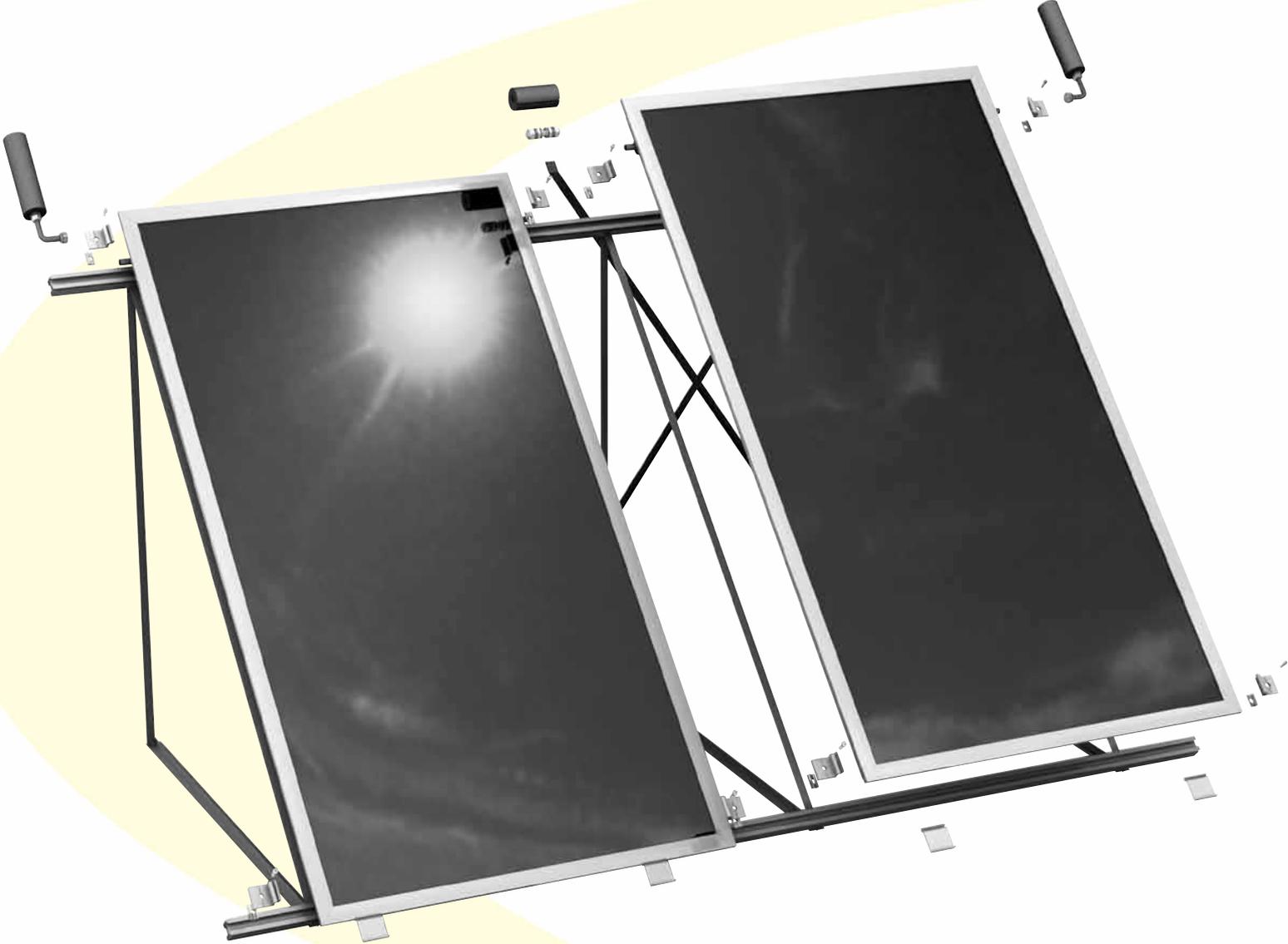
Figure 37: Fixing the Fishplate



Figure 38: Joining Mounting Rails

Now go to Section 7.

5 Flat Roof System Installation

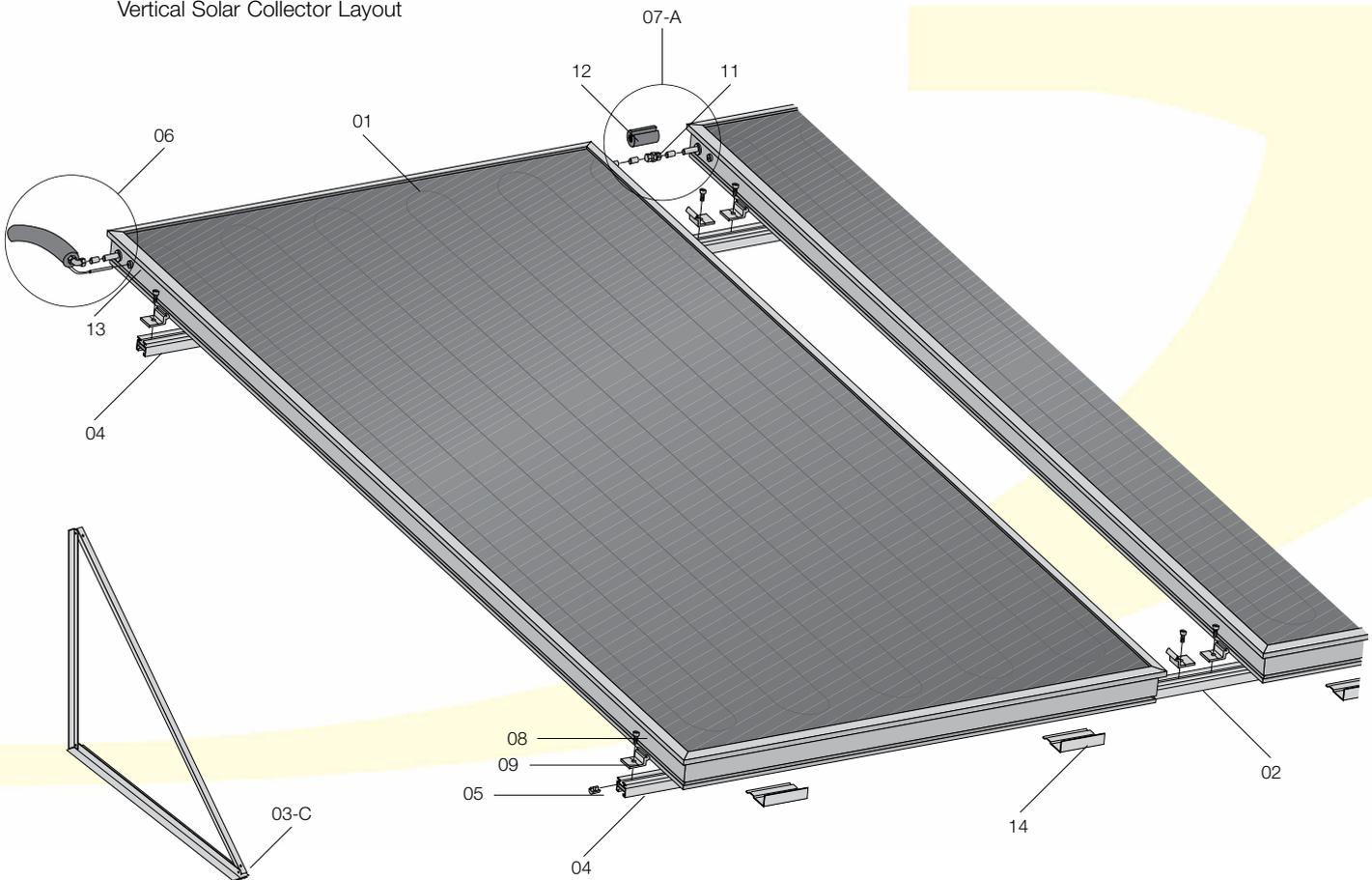


5.1 Installation Summary

The standard installation kit allows solar collectors to be fitted vertically onto horizontal mounting rails.

Item	Description
01	Collector
02	Mounting rail set
03	Roof Anchors -C to flat roof anchors
04	Rail profile
05	Anchor block
06	Collector connection kit
07	Collector to collector connection kit
08	Cylinder anchor bolt
09	Fixing Bracket
11	Hydraulic connection
12	Insulation
13	Temperature sensor
14	Mounting hooks
15	Cruciform

Figure 39: Installation Summary, Vertical Solar Collector Layout



5 Flat Roof System Installation

5.2 Flat Roof System Installation

1. Lay mounting rails on the installation surface with the wide groove uppermost. Mounting rail interval = 1770mm.
Diagonal dimensions between mounting rails must be equal: $D1 = D2$

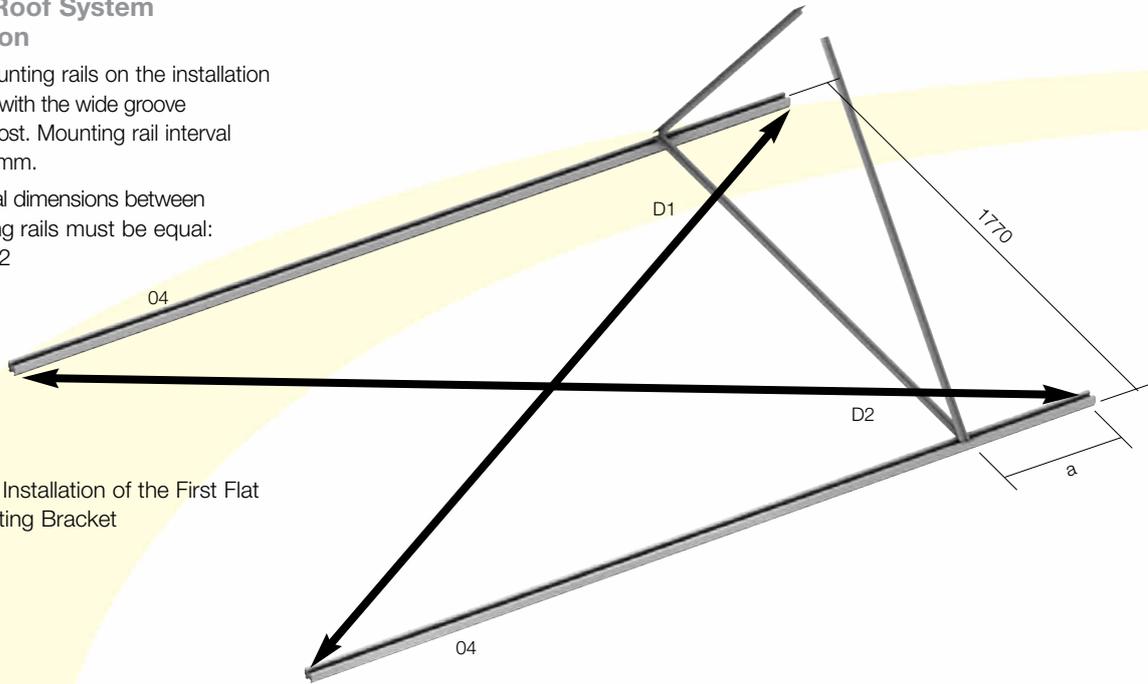


Figure 40: Installation of the First Flat Roof Mounting Bracket

2. Open out a prefabricated flat roof mounting bracket and place the long L-profile on the mounting rail so that the T-profile points backwards. For interval a, see Page 9, 3.2 Flat roof installation.
3. Fix the flat roof mounting bracket to the mounting rail using the interlocking bolts, serrated washers and nuts provided.

Note:
Interlocking bolts must be secured to the mounting rail using a 90° turn.

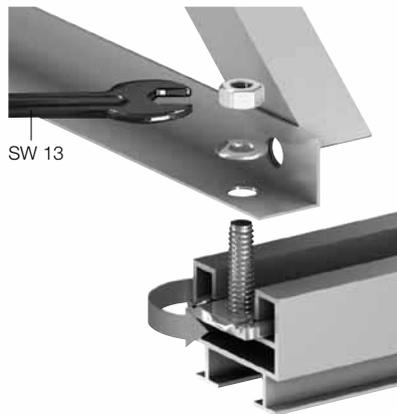
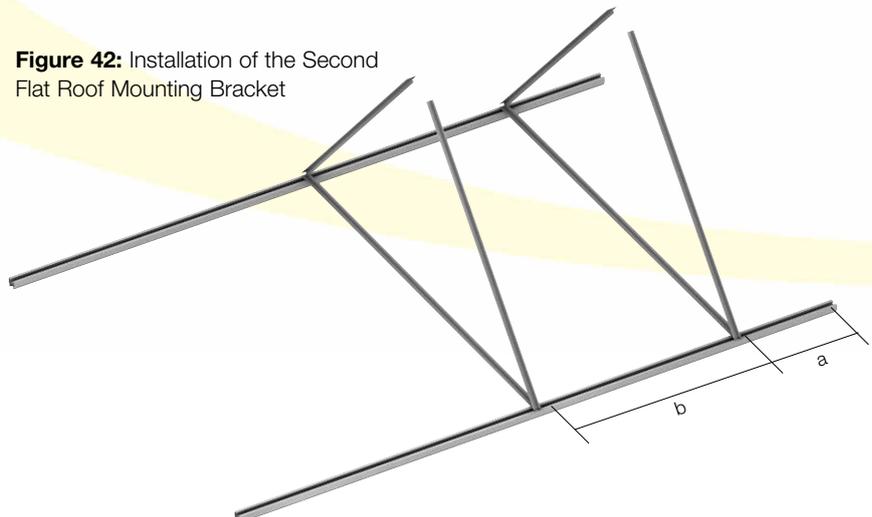


Figure 41: Fixing Using Interlocking Bolt

4. Place the next flat roof mounting bracket on the mounting rail and fix using the interlocking bolts. Do not tighten the bolts too tightly, as final adjustment may be required. For interval b, see Page 9, 3.2 Flat roof installation.

Figure 42: Installation of the Second Flat Roof Mounting Bracket



5. Unscrew securing cruciform (24). It is fixed to the legs of the flat roof mounting bracket and the mounting rail.

Place the angled long ends of the securing cruciform between the flat roof mounting bracket and fix with bolts (M8x18), washers and nuts.

Note:

Always fit the stays of the securing cruciform to the right hand side of the flat roof mounting angles. See detail views (A and B).

6. Tighten the nuts on the interlocking bolts. If necessary, modify the position of the second flat roof mounting bracket.

Note:

Use punching bolt (15) with offset screw tip for fixing to the mounting rail. Do not confuse with cylinder bolt (08)!

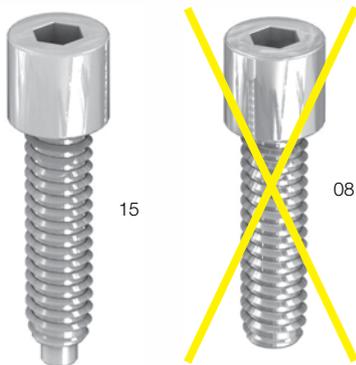


Figure 43: Punch bolt/cylinder bolt

7. Place an interlocking nut (23) in mounting rail (04) and secure it in the mounting rail by turning it 90°. Place a spacer sleeve (22) on the interlocking nut and fix the stays of the securing cruciform (24) using locking washer (21) and punching bolt (15).

Tighten the punching bolt until a clear snap is heard. Continue to turn and tighten normally.

Caution:

Turning the punching screw fixes the securing cruciform into its final position; check distances and correct seating of the interlocking nuts beforehand.

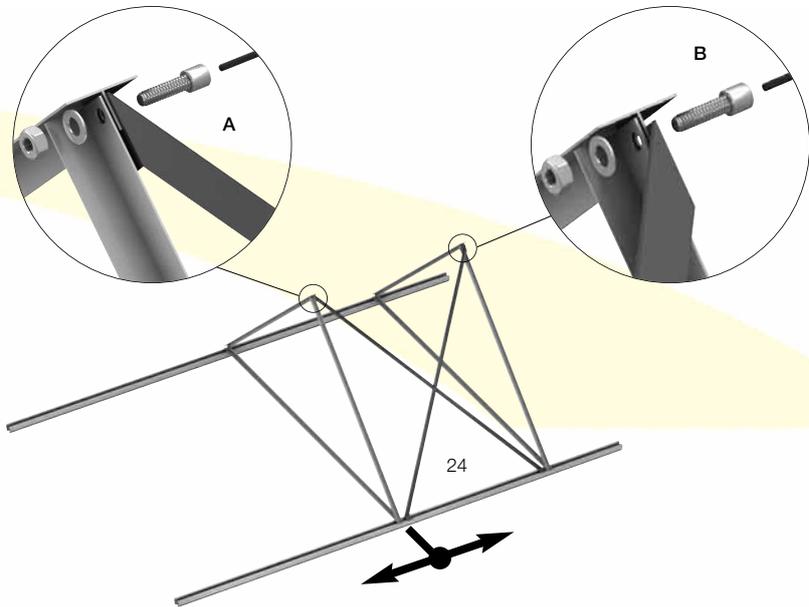


Figure 44: Installation of the Second Flat Roof Mounting Bracket

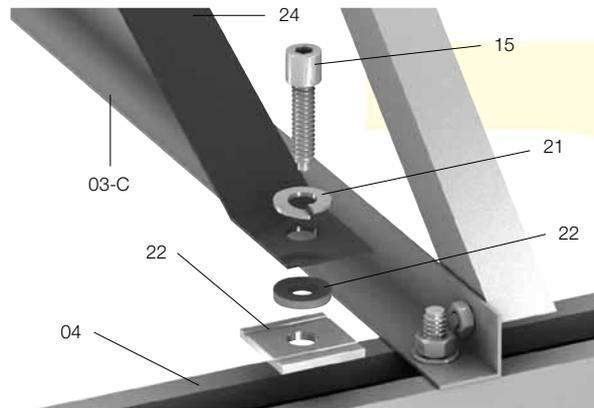


Figure 45: Fixing the Securing Cruciform and Mounting Rail

5.3 Joining Mounting Rails

1. On some installations it may be necessary to join two or more sections of mounting rail to create a longer length of rail.
2. Join the sections of rail using the screws and fishplates (supplied in the fixing kit provided). Refer to the procedure given in section 4.6 (on page 17).

5 Flat Roof System Installation

- Fix all further flat roof mounting brackets to the mounting rails in accordance with steps 2-4, and fix the legs tightly using cylinder bolts M8x18mm.

For mounting bracket intervals see Page 9, 3.2 Flat roof installation.

- Place the flat roof mounting frame together with the T-profiles, align according to plan and make the structure robust.

To prevent damage to the roof covering, it may be necessary to use protective mats. If the flat roof mounting frame is not bolted to the building structure, it must be secured according to technical requirements.

Caution:

The flat roof mounting frame must be adequately weighted down or bolted. If the supporting frame is secured by weights rather than being screwed down, the weights must conform to the following specifications for a wind pressure zone up to 8 m building height and a snow load zone up to 0.75 kN/m², according to the table.

Permissible roof load must not be exceeded under any circumstances, and if necessary a structural engineer must be consulted beforehand. If the substructure has been penetrated, it must be carefully re-sealed in accordance with technical standards.

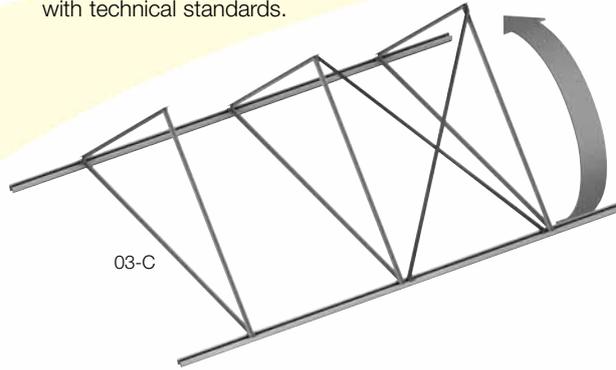


Figure 46: Fixing Additional Flat Roof Mounting Brackets

Table 3: Dead Weight Requirements

Flat roof installation	Up to 8m
1 solar collector	290 kg
2 solar collectors	580 kg
3 solar collectors	870 kg
4 solar collectors	1,160 kg
5 solar collectors	1,450 kg

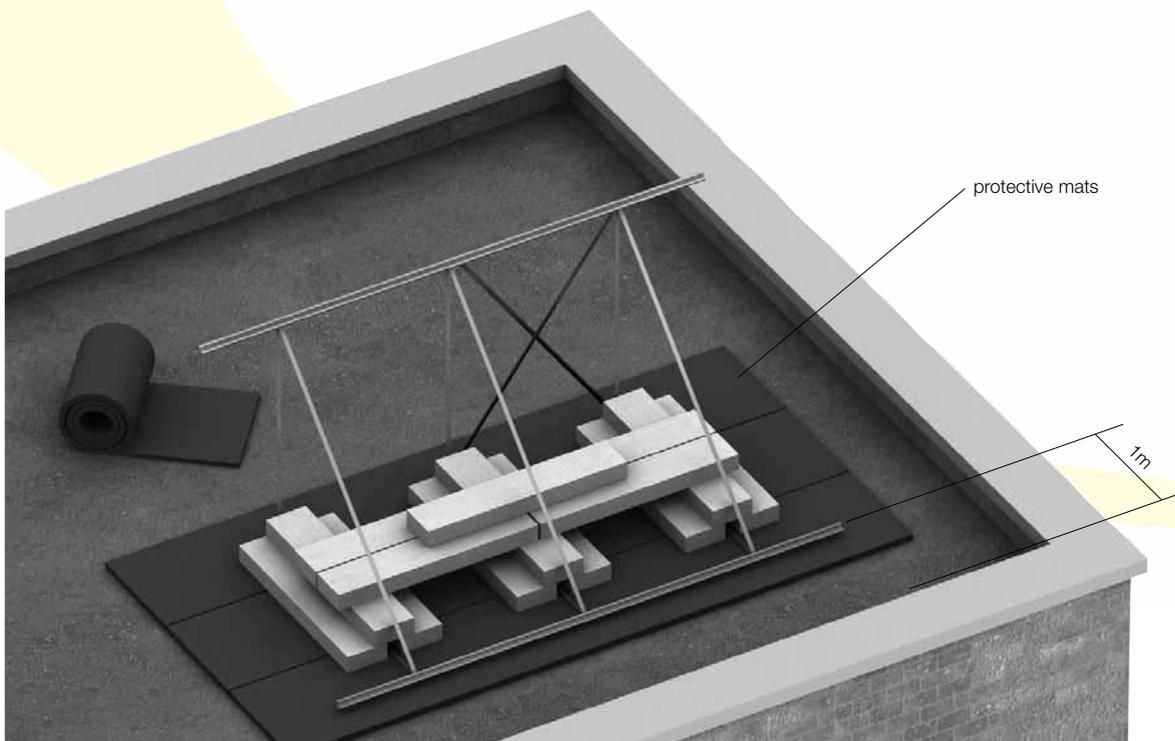
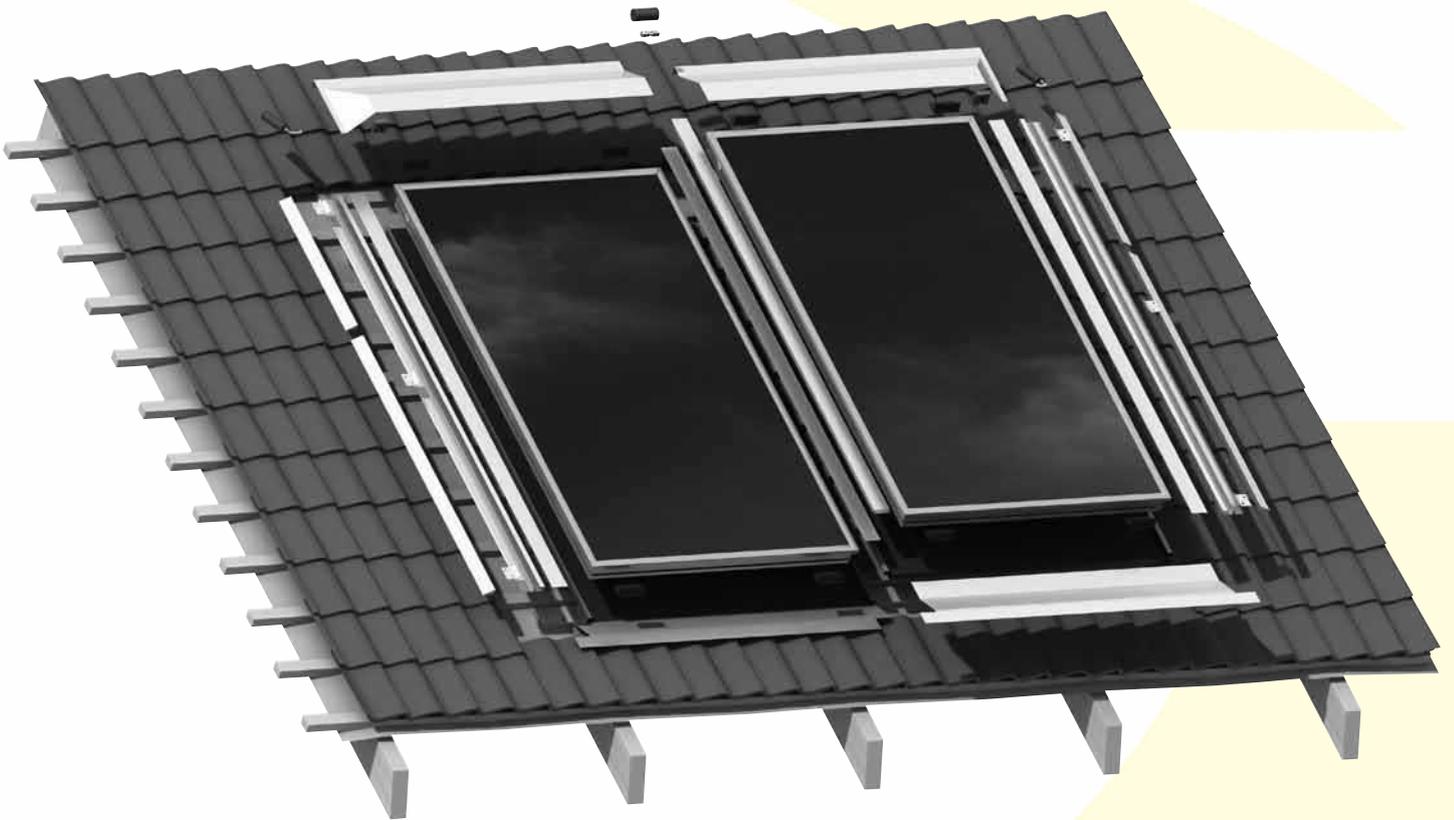


Figure 47: Robustness (Weighting)

Now go to Section 7.

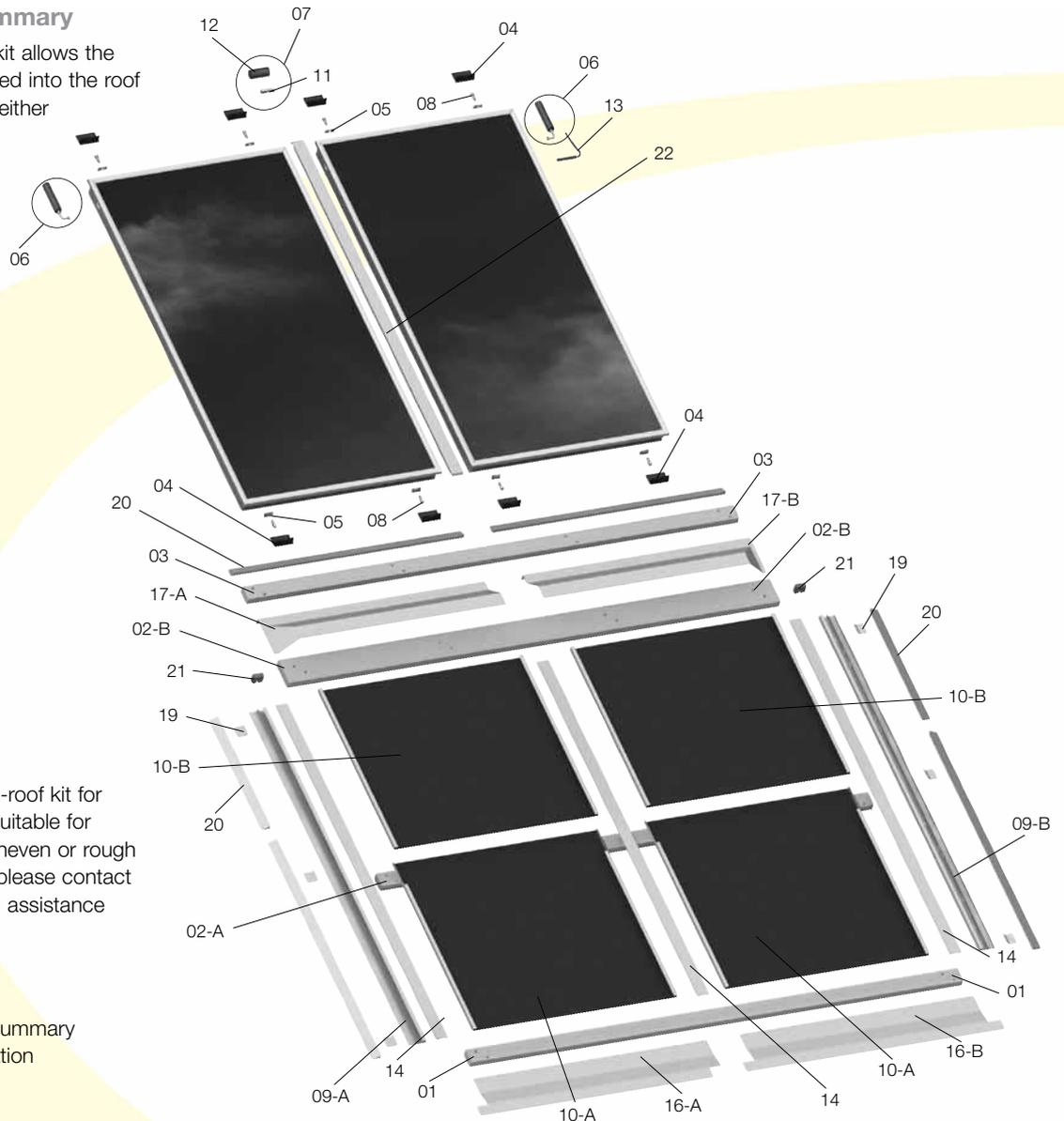
6 In-Roof System Installation



6 In-Roof System Installation

6.1 Installation Summary

The In-Roof installation kit allows the solar collectors to be fitted into the roof covering (tiles or slates) either horizontally or vertically.



** The standard Grant in-roof kit for slate roofs may not be suitable for some reclaimed slate, uneven or rough slate roofs. In this case please contact Grant UK for advice and assistance regarding suitability.

Figure 48: Installation Summary
Vertical Collector Installation

Item	Description
01	Bottom batten (30 x 50mm)*
02-A	Lower middle batten (30 x 50mm)*
02-B	Upper middle batten Middle batten (30 x 90mm)*
03	Top batten (30 x 50mm)*
04	Mounting bracket
05	Anchor block
06	Collector connection kit
07	Collector to collector connection kit (portrait collectors only)

* Battens to be supplied by installer. Dimensions given are for guidance - batten thickness must match existing tile battens. Timber must be treated e.g. Tanalised or similar.

Item	Description
08	Cylinder anchor bolt
09-A	Side gutter - Left hand
09-B	Side gutter - Right hand
10-A	Base tray - lower section
10-B	Base tray - upper section
11	Hydraulic connection
12	Insulation
13	Temperature sensor
14	Cover strip
15-A**	Bottom flashing - Left hand (for slates)
15-B**	Bottom flashing - Right hand (for slates)

Item	Description
16-A	Bottom apron - Left hand flashing (for tiles)
16-B	Bottom apron - Right hand flashing (for tiles)
17-A	Top cover - Left hand flashing
17-B	Top cover - Right hand flashing
18	Fixing screw - not shown
19	Clip (with nail - not shown)
20	Foam draught seal wedge
21	Foam draught seal block
22	Closure strip

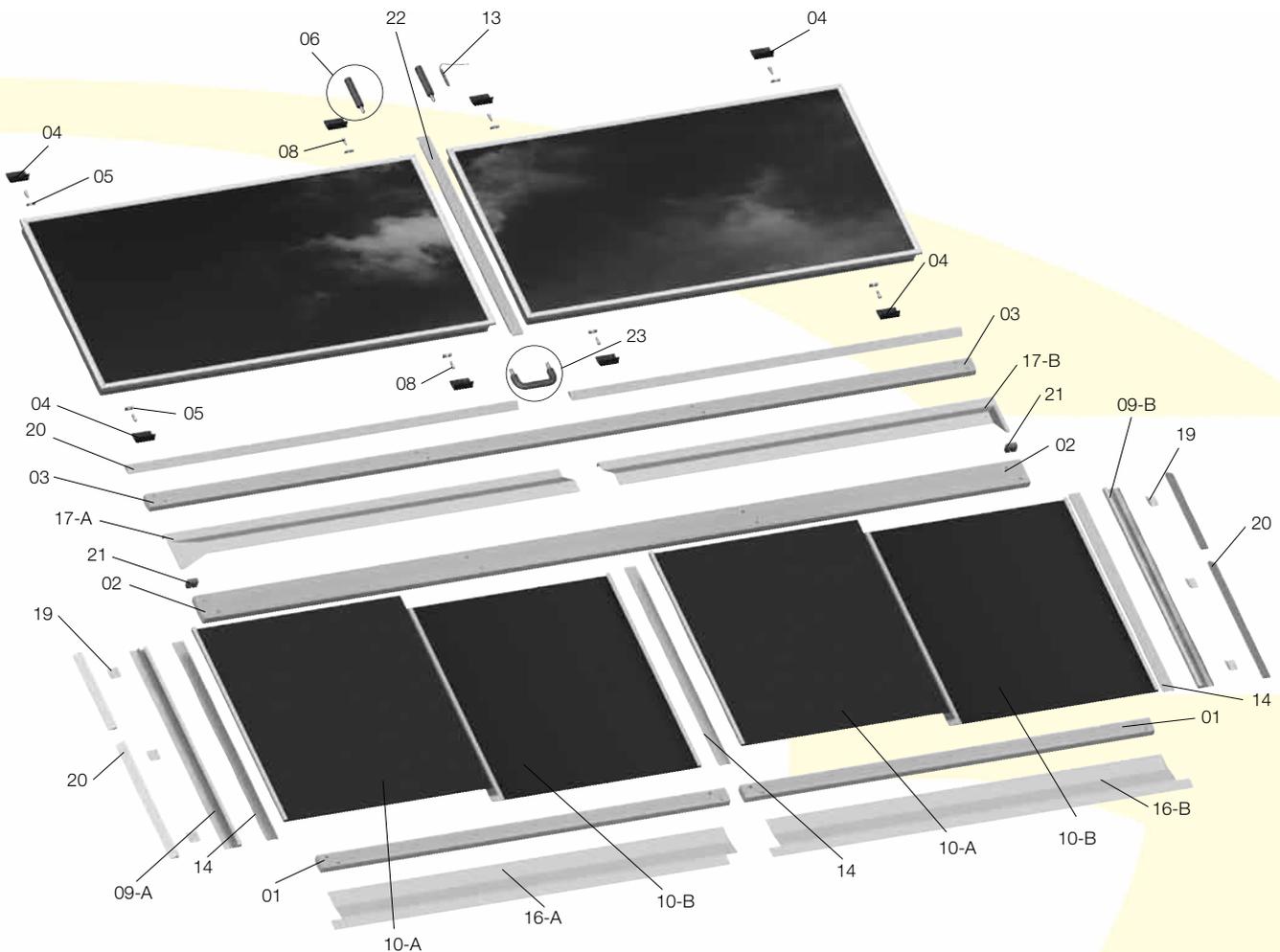


Figure 49: Installation Summary
Landscape Collector Installation

** The standard Grant in-roof kit for slate roofs may not be suitable for some reclaimed slate, uneven or rough slate roofs. In this case please contact Grant UK for advice and assistance regarding suitability.

Item	Description
01	Bottom batten (30 x 50mm)*
02	Middle batten (30 x 90mm)*
03	Top batten (30 x 50mm)*
04	Mounting bracket
05	Anchor block
06	Collector connection kit

* Battens to be supplied by installer. Dimensions given are for guidance - batten thickness must match existing tile battens. Timber must be treated e.g. Tanalised or similar.

Item	Description
08	Cylinder anchor bolt
09-A	Side gutter - Left hand
09-B	Side gutter - Right hand
10-A	Base tray - left half
10-B	Base tray - right half
11	Hydraulic connection
12	Insulation
13	Temperature sensor
14	Cover strip
15-A**	Bottom flashing - Left hand not shown (for slates)
15-B**	Bottom flashing - Right hand not shown (for slates)

Item	Description
16-A	Bottom apron - Left hand flashing (for tiles)
16-B	Bottom apron - Right hand flashing (for tiles)
17-A	Top cover - Left hand flashing
17-B	Top cover - Right hand flashing
18	Fixing screw - not shown
19	Clip (with nail - not shown)
20	Foam draught seal wedge
21	Foam draught seal block
22	Closure strip
23	Collector to collector connection kit (landscape collectors only)

6 In-Roof System Installation

Important:

The standard Grant in-roof kit for slate roofs may not be suitable for some reclaimed slate, uneven or rough slate roofs. In this case please contact Grant for advice and assistance regarding suitability.

6.2 Substructure

Caution:

Do not attach safety harness to the integrated roof installation system!

1. Remove tiles in the installation area. Intervals must be above those given on Page 10/11. For ease of installation, an additional continuous row of roof tiles is required.

Caution:

Adequate rear ventilation of the integrated roof installation must be provided using suitable means (e.g. cross battens). A waterproof membrane (waterproof membrane) is absolutely essential.

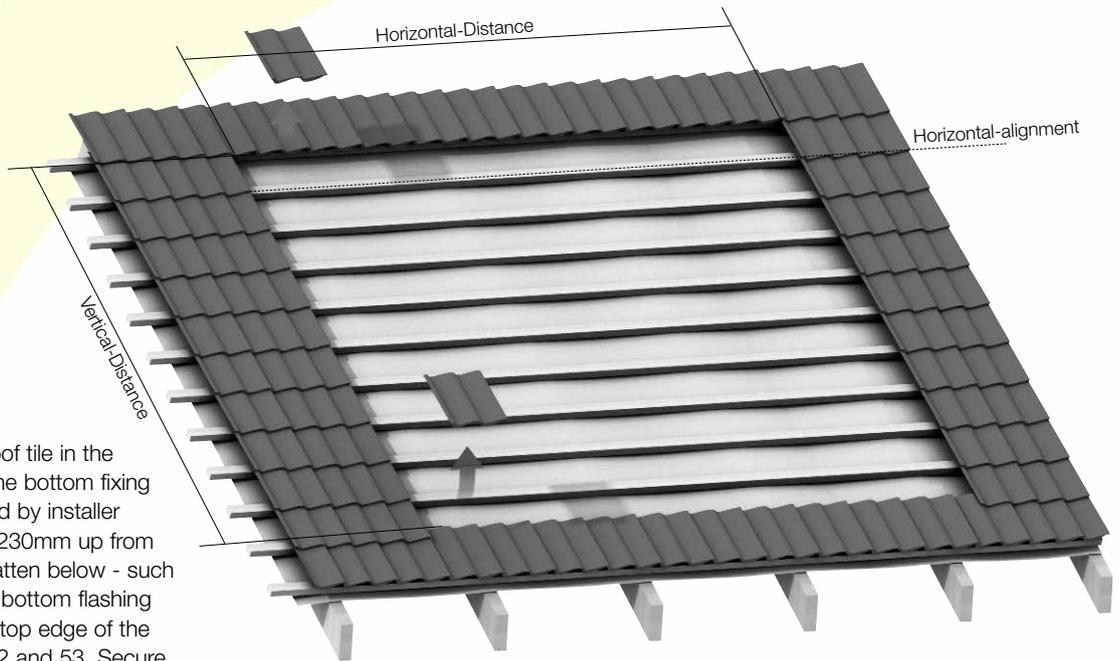


Figure 50: Remove Roof Covering

2. Remove the last roof tile in the row and position the bottom fixing batten (01) supplied by installer between 180 and 230mm up from the existing roof batten below - such that the fold in the bottom flashing sits exactly on the top edge of the tiles - see Figure 52 and 53. Secure the bottom batten to the rafters with screws (supplied by installer).

Note:

The specified thickness for the battens is 30mm. If the existing roof battens are thicker then it will be necessary to either pack out the battens or use thicker ones so the top of each batten is flush with the existing roof battens.

Note:

The screws for fixing the horizontal fixing battens must be provided by the installer.

Do not use sealing screws (16) supplied in the installation kit.

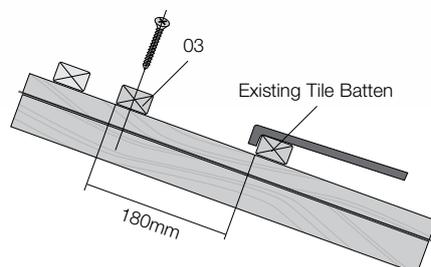
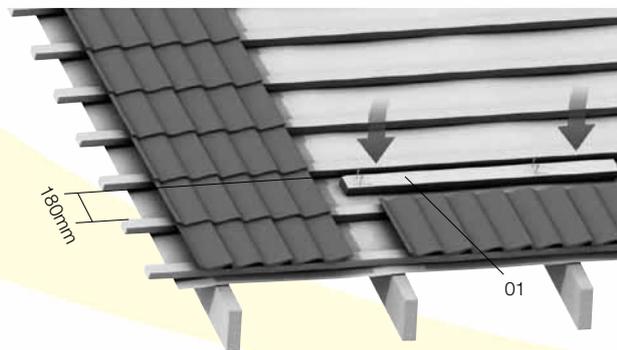


Figure 52: Bottom Fixing Batten

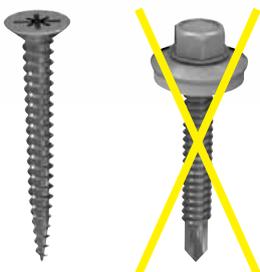


Figure 51: Screw Comparison

3. Align the upper middle batten (02-B), the lower middle batten - portrait only (02-A) and top (03) to the bottom horizontal batten (01). Refer to table for the intervals between the battens. Secure the battens to the rafters with screws (supplied by installer).

Table 4: Fixing Batten Spacing

Intervals between fixing battens (mm) for In-roof installation		
Dimension	portrait side by side	landscape side by side
A	2025	1125
B	260	260
C	1110	N/A

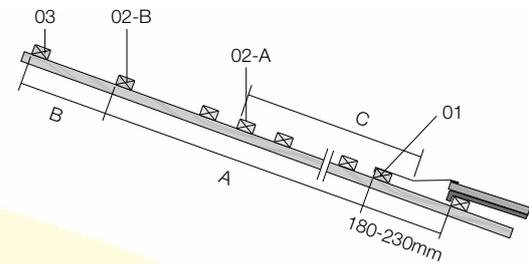
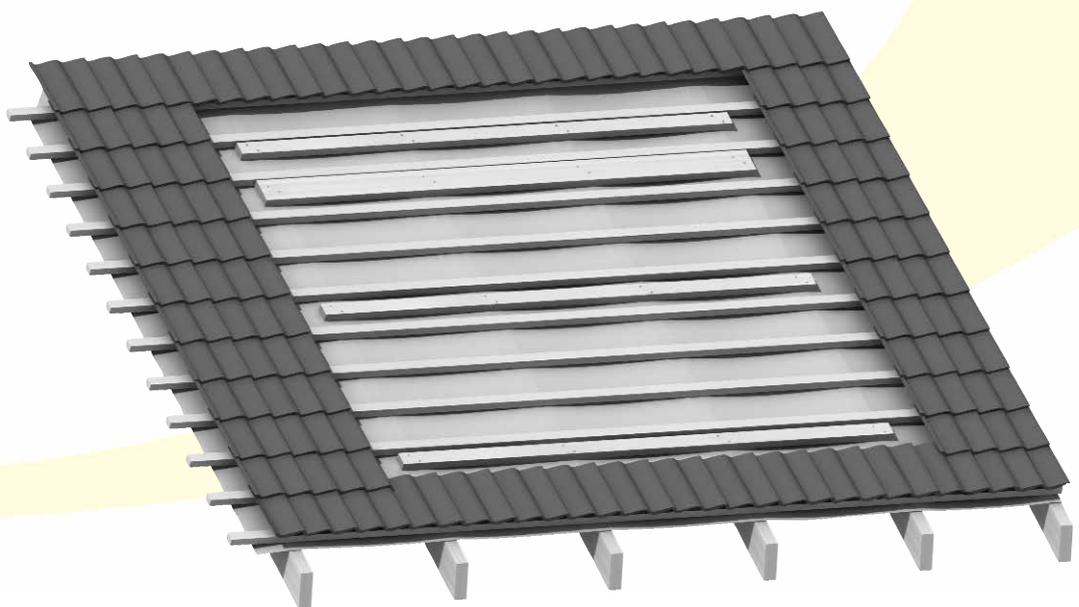
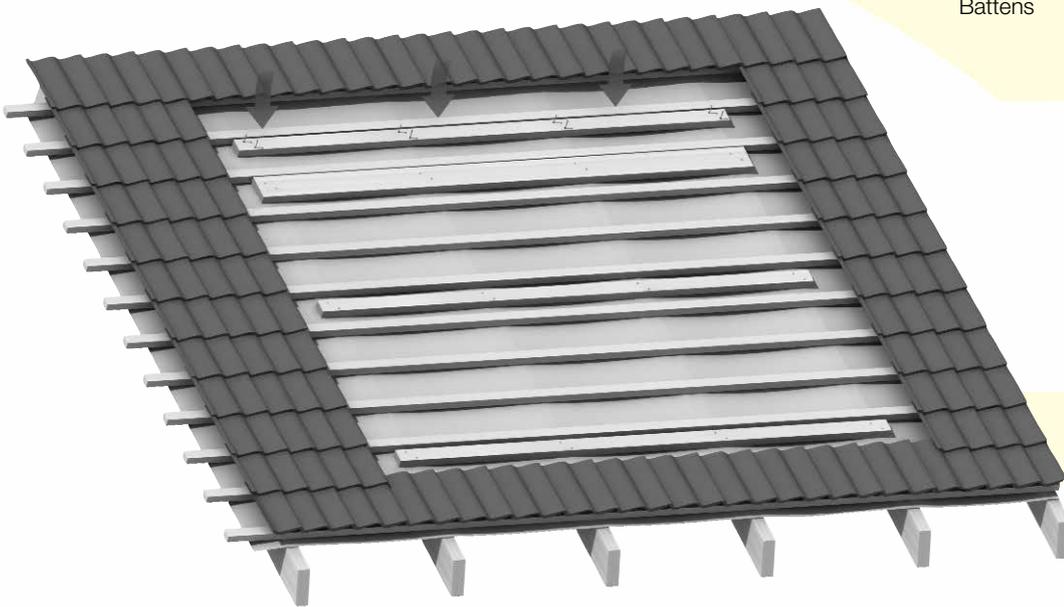


Figure 53: Top, Upper middle, Lower middle and Bottom Horizontal Fixing Battens



6 In-Roof System Installation

6.3 Installation of In-Roof Kit

1. Fit the bottom flashings.

Note:

The lead aprons on the bottom apron flashings (16-A & 16-B) for use with tiles are supplied folded back. Carefully fold out the lead aprons before installation. **Do not modify** the flashings or lead aprons. Leave the protective film in place on the butyl tape at this stage.

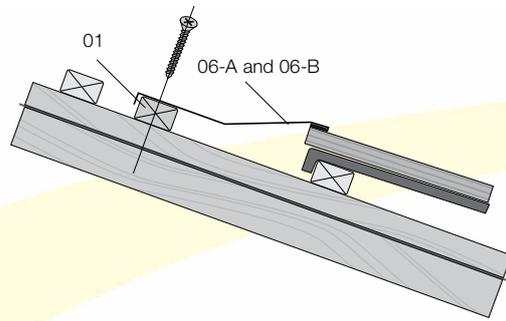


Figure 54: Installation of Bottom Flashing

Note:

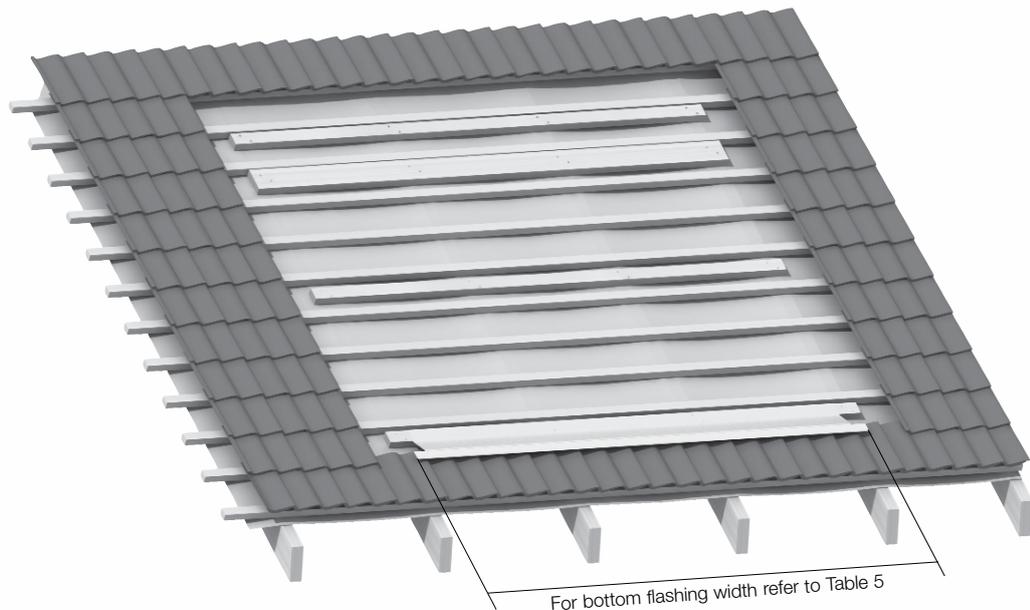
butyl tape has strong adhesive properties and mistakes cannot be rectified after application!

Table 5: Overall Width Dimensions

Overall width dimensions (mm) for In-roof installation		
Qty	portrait (side by side)	landscape (side by side)
1	1460	2355
2	2645	4440
3	3835	6525
4	5025	8615
5	6215	10700



Figure 55: Installation of Additional Bottom Flashings



2. Position the bottom flashings on the bottom batten - with the left flashing overlapping the right in the centre. Adjust width of the bottom flashing to suit - see Table 5. Adjust the position of the bottom flashing as required to centre it in the opening in the roof tiles/slates or to avoid the need to cut tiles on one (or both) sides.

Note: For slates.

Before fitting the base trays - mark a pencil line across the bottom flashing 90mm down from, and parallel to, the TOP edge of the flashing.

Mark position of both ends of bottom flashing on batten. Remove left hand flashing and fix right hand flashing to batten using suitable small screws (not supplied).

Remove the protective film from the butyl tape on the right hand flashing. Ensure left hand flashing is correctly located, re-position on batten, pressing firmly on overlap to seal. Fix left hand flashing to batten using suitable screws (not supplied).

Repeat procedure for any further bottom flashing sections, as required.

Note: For slates.

Use the mastic bead supplied in the kit to seal the bottom flashing (15-A and 15-B) to the roof. Place the bead on the underside of the flashing, along the entire length, remove backing strip and press down to seal two slates.

Table 6: Position of Base Tray

Dimension C	
Portrait	145mm
Landscape	165mm

For 'Portrait' installations (refer to page 24)

- Fit first lower base tray (10-A). Position side of tray at distance 'C' from end of bottom flashing, with lower edge along the fold line of the bottom flashing – see figure 56c. Note: For slates Align the lower edge of the trays with the pencil line previously marked across the full width of the bottom flashing.

Fix to lower middle batten (02-A) using a single screw – at the centre of the upper edge – see Figure 56a. Do NOT use one of the sealing screws provided in the installation kit for this fixing.

Fit first upper base tray (10-B). Locate the lower edge of upper base tray into top of lower base tray until the side channels touch. Fix to upper middle batten (02-B) using one of the self-drilling sealing screws provided in the installation kit at the centre of the upper edge – see Figure 56b.

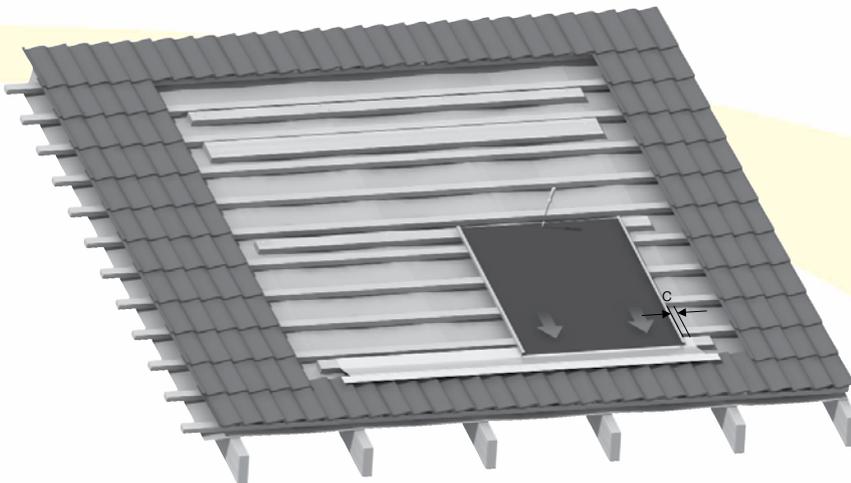


Figure 56a: Installation of Lower Base Tray

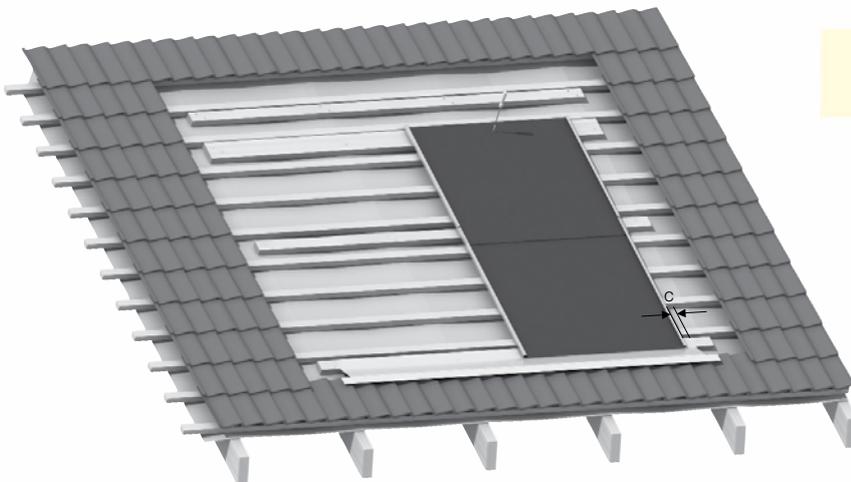


Figure 56b: Installation of Upper Base Tray

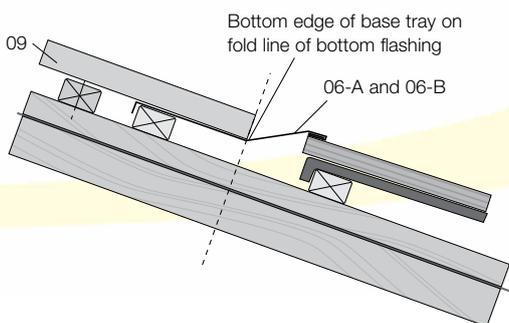


Figure 56c: Section Through Bottom Flashing

6 In-Roof System Installation

4. Fit second lower base tray. As with first lower base tray, position it with the lower edge along the fold line of the bottom flashing (or the pencil line in the case of slates). Ensure gap between trays does not exceed 4 mm – see Figure 57c. Fix to lower middle batten as before using a single screw – see Figure 57a.

Fit second upper base tray – locating it into top of lower tray and fixing to upper middle batten using one of the self-drilling sealing screws provided in the installation kit at the centre of the upper edge – see Figure 57b.

For installations using more than two collectors, repeat the above procedure to fit further lower and upper base trays as necessary.

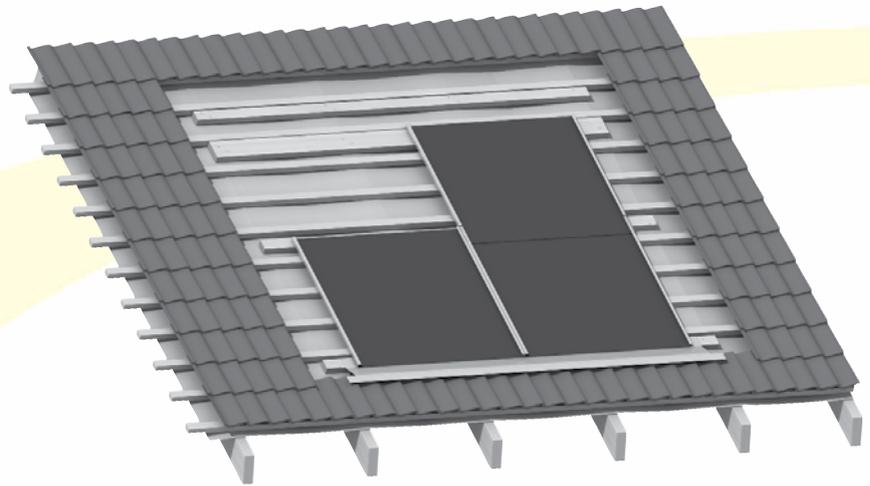


Figure 57a: Installation of First Base Tray

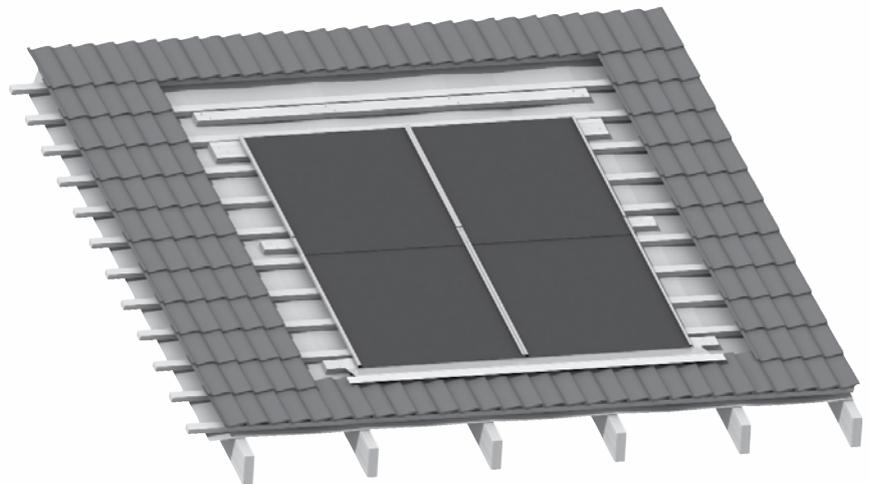


Figure 57b: Installation of Second Base Tray

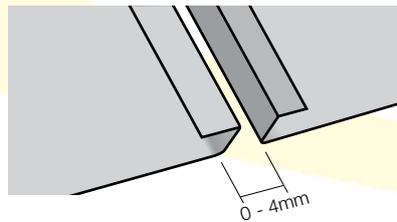


Figure 57c: Maximum Gap Between Base Trays

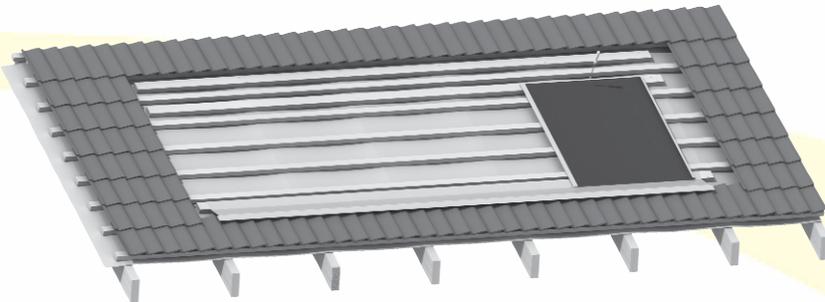


Figure 58a: Installation of First Tray

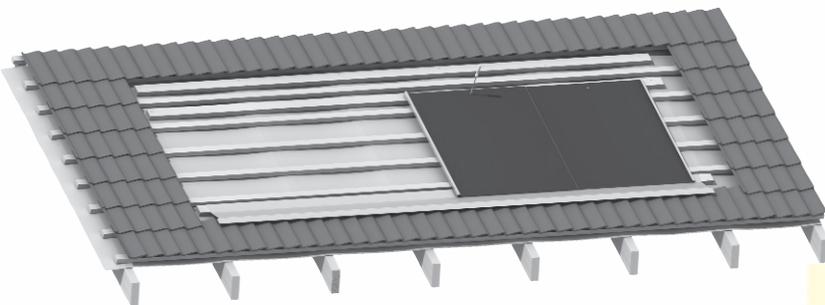


Figure 58b: Installation of Second Tray

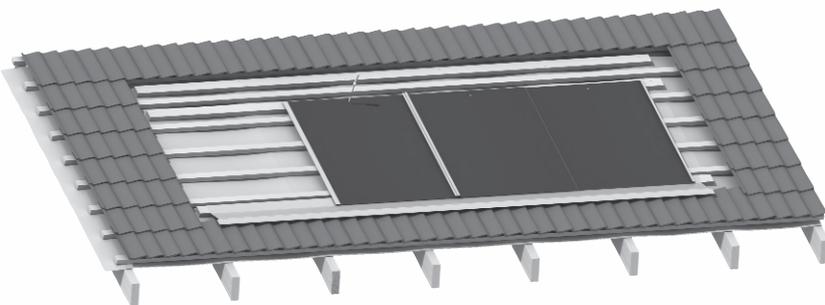


Figure 58c: Installation of Third Tray

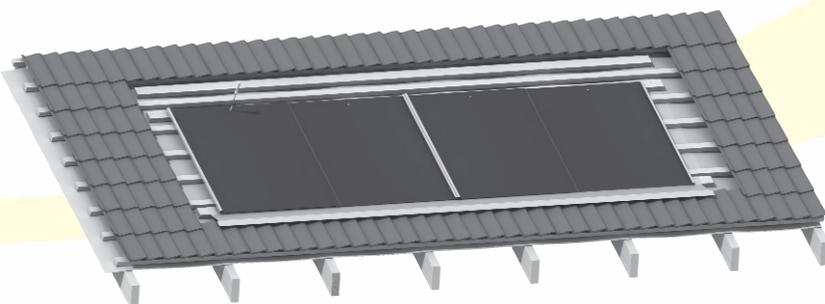


Figure 58d: Installation of Fourth Tray

**For 'Landscape' installations
(refer to page 25)**

5. Fit first right hand (RH) half base tray (10-B) with upwards facing return fold towards centre. Position side of RH half base tray at distance 'C' from end of bottom flashing with lower edge along the fold line of the bottom flashing – see figure 56c.

Note: For slates

Align the lower edge of the half base tray with the pencil line previously marked across the full width of the bottom flashing.

Fix to the middle batten(02) using one of the self-drilling sealing screws provided in the installation kit at the centre of the of the upper edge-see Figure 58a.

Fit first left hand (LH) half base tray (10-A), hooking the downwards facing return fold into the corresponding fold on the fixed RH half base tray. Position LH half base tray with lower edge along the fold line of the bottom flashing. Fix to middle batten using one of the self-drilling sealing screws provided in the installation kit at the centre of the upper edge – see Figure 58b.

6. Fit second RH half base tray. As with the first tray, position it with the lower edge along the fold line of the bottom flashing (or the pencil line in the case of slates). Ensure gap between trays does not exceed 4mm – see Figure 57c. Fix to middle batten using one of the self-drilling sealing screws provided in the installation kit at the centre of the upper edge – see Figure 59a.

Fit second LH half base tray – hooking over fold on RH half base tray, with lower edge along fold line of bottom flashing. Fix with a single screw as before – see Figure 59b.

For installations using more than two collectors, repeat the above procedure to fit further RH and LH half base trays as necessary.

6 In-Roof System Installation

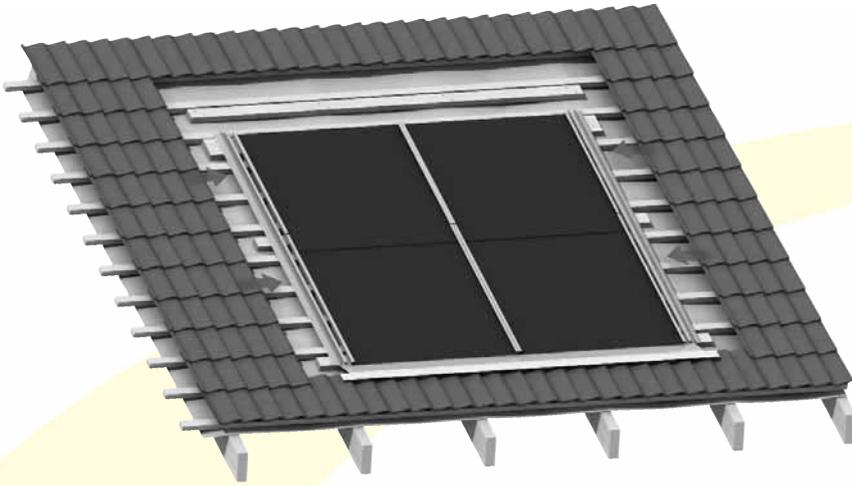


Figure 60: Installation of Side Gutter

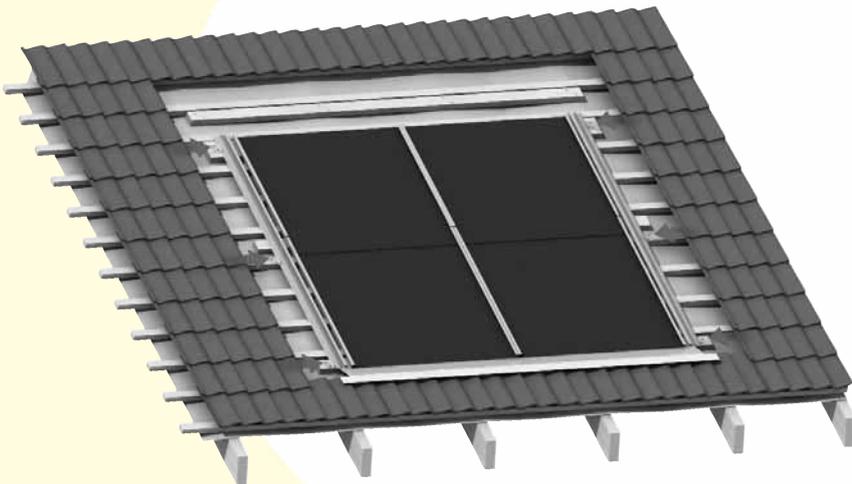


Figure 61: Location of Clips on Side Gutters

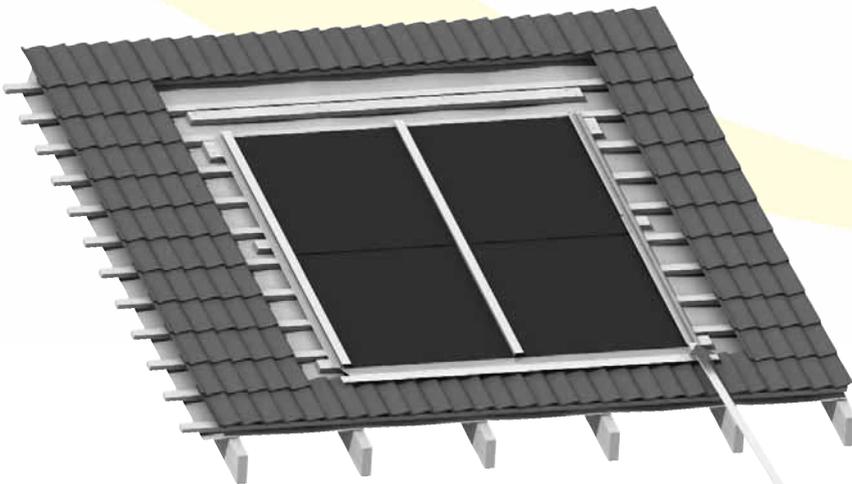


Figure 62: Fitting of Cover Strips

For either 'Portrait' or 'Landscape' installation continue as follows:

7. Fit side gutter (09). Position side gutters against side of base tray with bottom edge along fold line of bottom flashing. Ensure that outer edges of each side gutter is located **INSIDE** the return edge on the bottom flashing.
8. Secure side gutters in place using the clips provided. Hook the clips over the outer edge of the side gutters and fix to battens using the nails provided.



Figure 63: Securing Side Gutter Clips

9. Fit cover strip on the joint between the base tray and side gutter. Fit the end of the strip onto the two outward facing flanges - see Figure 64. Slide cover strip up the full length of the joint. Finally fold over at both ends of cover strip to secure - see Figure 65. Repeat to fit cover strips on the other side gutter and on all joints between the base trays.

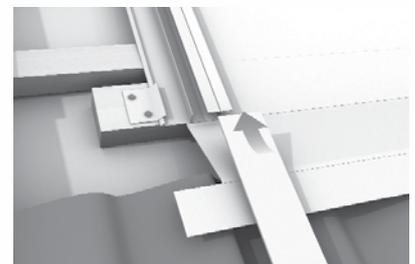


Figure 64: Installation of Cover Sheets

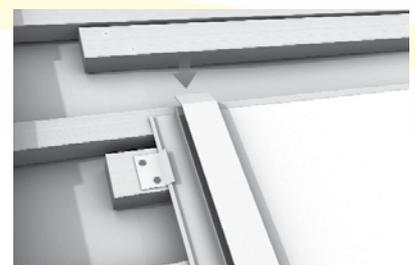


Figure 65: Installation of Cover Sheets

6.4 Installation of Collectors

1. Position mounting brackets (04) at the bottom of the base tray with the bottom edge of the mounting brackets 10mm above the bottom edge of the base tray. Refer to Figure 67 and 68. Carefully mark their position on the base tray with a pencil.

Important:

Ensure brackets are correctly positioned with the two holes at the top. Remove protective film from underside of brackets and press them into place in the correct position. Fix in place with the self-drilling screws supplied in the kit using the Torx 25 screwdriver bit provided in the kit. Refer to Figure 67.

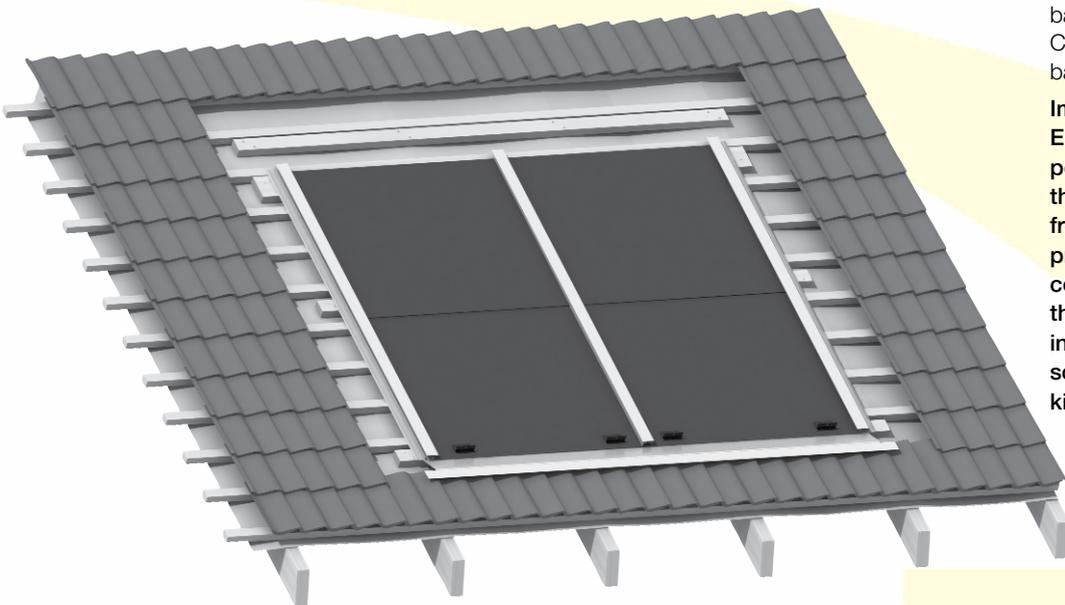


Figure 66: Location of bottom Mounting Brackets

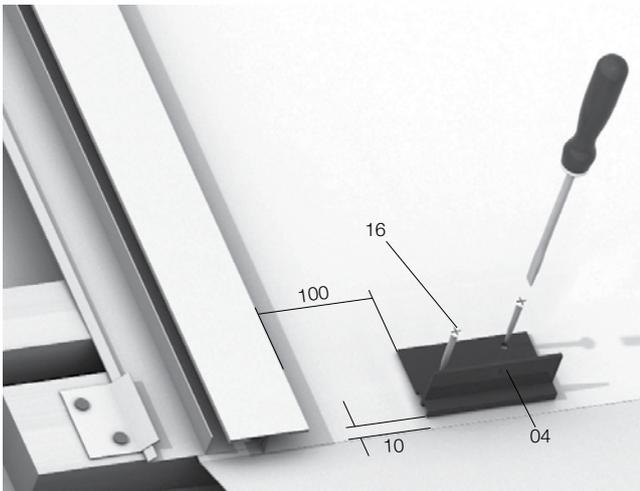


Figure 67: Fixing of bottom Mounting Brackets

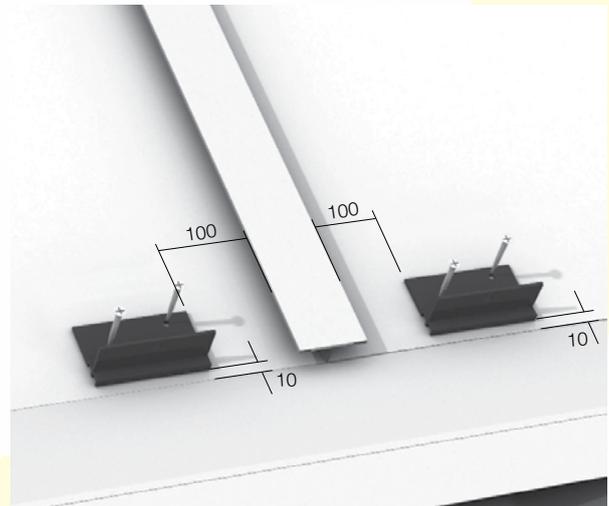


Figure 68: Bottom Mounting Bracket Dimensions

6 In-Roof System Installation

2. Fit two anchor blocks (05) into the profile at the bottom and top of each collector. Lift first collector and position on two mounting brackets. See Figure 69. Adjust position of anchor blocks to align with hole in each mounting brackets. Repeat for second collector, and so on for further collectors.
3. Install the top mounting brackets after collectors have been fitted onto bottom mounting brackets. Remove the protective film from the underside of two mounting brackets. Lift top end of one collector and position the two mounting brackets (with the holes at the top) against the top edge of the collector. Lower the collector and press the bracket into place on the base tray. Fix in place with the self-drilling screws supplied in the kit using a Torx 25 screwdriver. Refer to Figure 71.
4. Adjust position of the two anchor blocks in top collector profile to align with the hole in the two mounting brackets. Fit the two cylinder bolts through the top mounting brackets into the anchor blocks and tighten. Repeat for bottom mounting brackets.
5. Repeat procedure for second collector, and so on, as required.

6.5 Fitting Top Cover Flashing

Note:

Flow and return system pipework, and connections between collectors, should be completed and tested before fitting closure strip(s) and top cover flashings to collectors.

1. First fit closure strip to cover the gap between two collectors. Locate one of the two long flanges on the underside of the closure strip against the side of one of the two adjacent collectors. Push on the other flange until the closure strip clips into place between the collectors.
2. Ensure that the closure strip is contact with the collector sides over its entire length. Slide the closure strip up or down, as necessary, to align it with the top and bottom with the ends of the collectors. Fold the closure strip ends over the top and bottom of the collectors to secure the closure strip in place.

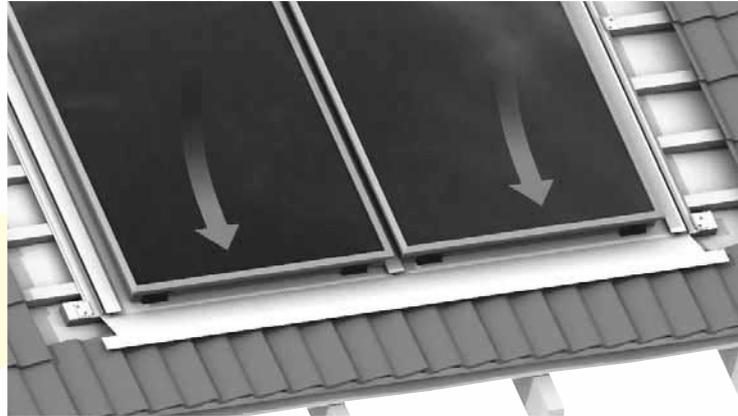


Figure 69: Installation of the Collectors on to Bracket

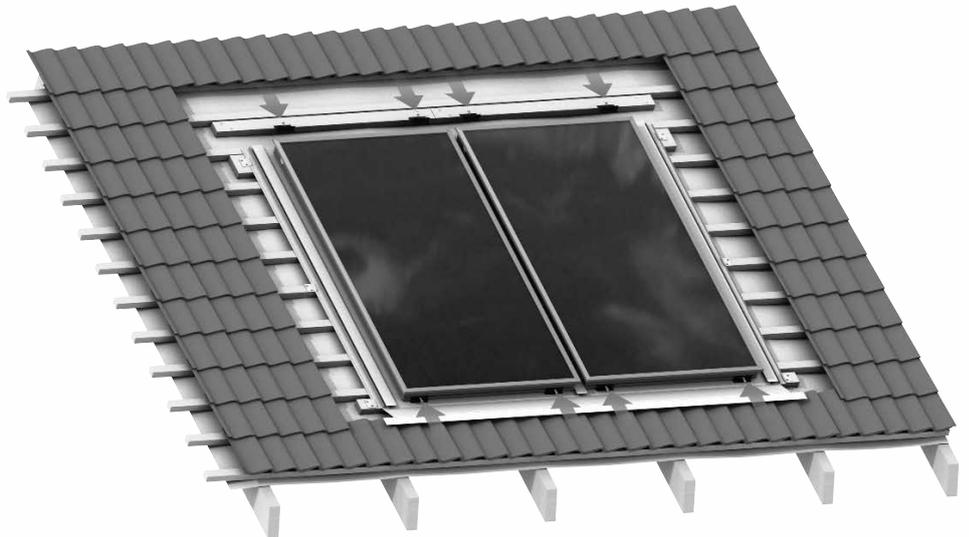


Figure 70: Installation of the Top Brackets



Figure 71: Fixing of the Top Brackets

3. Repeat this process to fit further closure strips, as required.
4. Fit right hand top flashing first. Locate slot in lower edge of flashing onto top edge of collector. Ensure right hand end of flashing is fitted **INSIDE** the return edge on the right hand side gutter.
5. Fit left hand top flashing onto top edge of collector, overlapping the right hand flashing in the centre. Ensure left hand end is fitted **INSIDE** the return on the left hand side gutter. Fix the right hand flashing to the batten beneath using the self-drilling screws provided in the kit. See Figure 73.
6. At the centre, lift the end of the left hand top cover flashing and remove the protective film from the Butyl tape on the right hand flashing. Press down the end of the left hand flashing to seal. Fix the left hand flashing to the batten beneath using the self-drilling screws provided in the kit.

6.6 Closing the Roof

1. If necessary, the right roof tile row must be cut. It may also be necessary to remove the upstands fitted to the roof tiles on the sheet side (side cover sheet).
 Note:
 To improve the weather-tightness of the roof covering, optional foam wedges can be bonded to the side flashings before closing the roof area.
2. Roof tiles above the solar collector field are usually cut also. Overlapping for the top cover sheets must be carried out according to the following values for roof incline:
 = 35° at least 120mm
 > 35° at least 100mm
 > 50° at least 80mm

Important:

Following installation the collectors must be covered, to stop solar radiation reaching them, until completion of filling and commissioning.

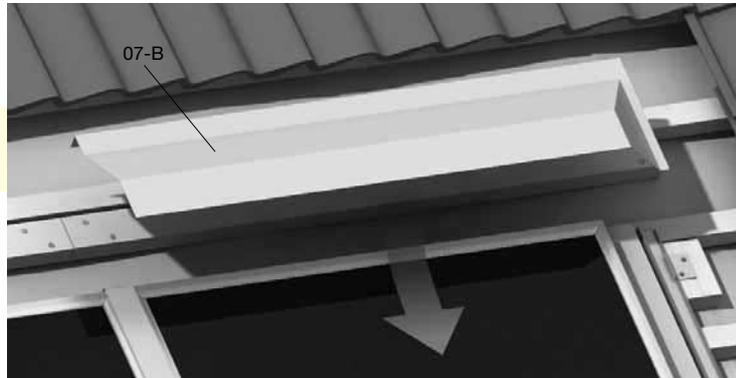


Figure 72: Fitting right Top Cover Flashing (07-B) to Collector



Figure 73: Fixing left hand Top Cover Flashing (07-A)



Figure 74: Fitting Foam Block (14)

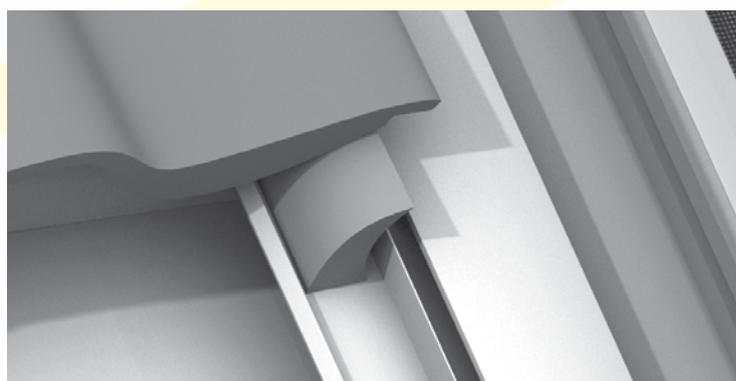


Figure 75: Position of Foam Sealing Wedges

7 Installation of Solar Collectors

Figure 76: Connections for Portrait Format Collectors Mounted Side by Side

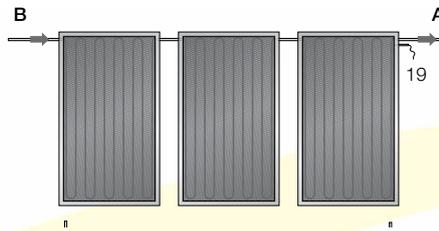


Figure 77: Connections for Landscape Format Collectors Mounted one Above the Other

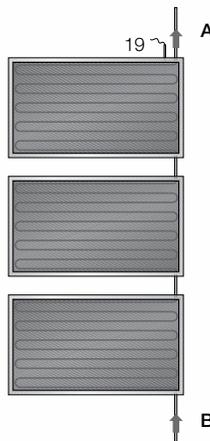


Figure 78: Connections for Two Landscape Format Collectors Mounted Side by Side

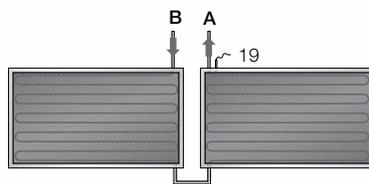


Figure 79: Connections for Two Portrait Format Collectors Mounted one Above the Other

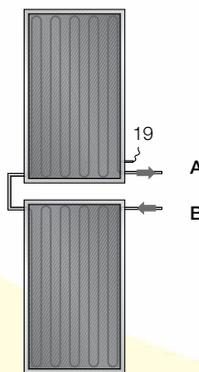
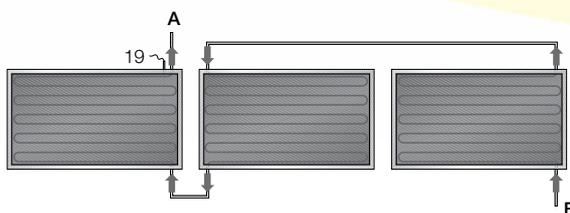


Figure 80: Connections for Three Landscape Format Collectors Mounted Side by Side



7.1 Installation Sequence of Solar Collectors

In accordance with solar collector connection and installation type, there are small differences in the installation sequence of solar collectors.

- If the installation kit contains **straight** compression fittings, these **must** be installed **during** solar collector installation. Refer to section 8.1
- If the installation kit contains **angled** compression fittings, these **must** be installed **after** solar collector installation. Refer to section 8.2

The choice of Outlet (flow) connection 'A' and inlet (return) connection 'B' for the collector array is up to the installer - to suit the installation.

Caution:

Locate the temperature sensor of the solar controller in the sensor pocket next to the outlet (flow) connection of the collector array

Important:

All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the solar primary circuit.

Plastic pipe must NOT be used for any part of the solar primary circuit.

7.2 Installation of Solar Collectors - On-Roof and Flat Roof

1. Note:
Do not carry the solar collectors by their connections. Use carry handles!
To install carry handles, fit anchor blocks (05) to the solar collector profile and fix the carry handles using two cylinder bolts M8x14 (08).

2. Fit two mounting hooks (14) per solar collector in the lower mounting rail.
Fit the mounting hooks into the mounting rail so that they will be 100mm away from the edge of the solar collectors

Distance c :

For portrait collector format approx. 800mm

3. Place the first solar collector on the mounting rail/mounting hook and align.
Distance to left-hand mounting rail edge = 39mm

4. Remove carry handles from the first solar collector and attach them to the next solar collector.

5. Install anchor blocks (05) at the end of the mounting rail (04) and place them so that the fixing brackets (09) can be screwed flush to the ends of the mounting rail.

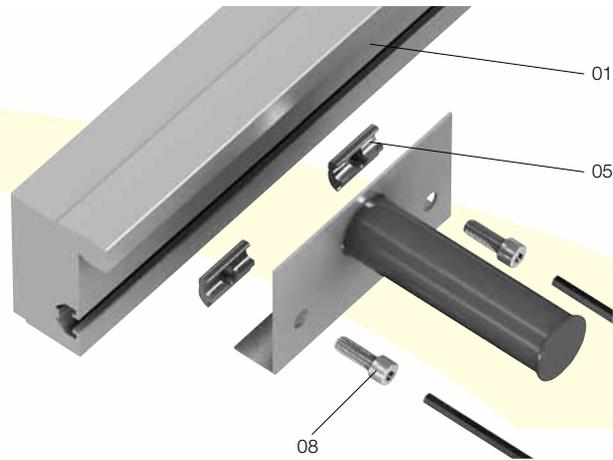


Figure 81: Fixing the Carry Handles

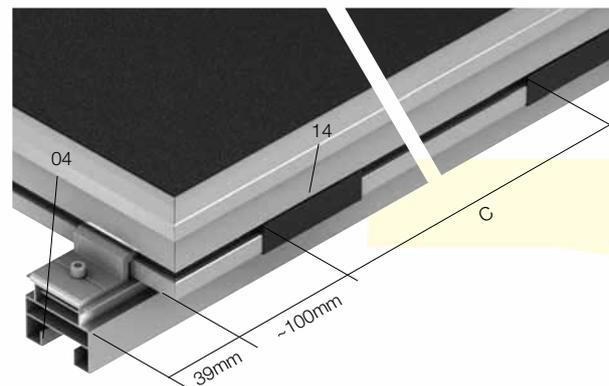


Figure 82: Positioning the Mounting Hooks

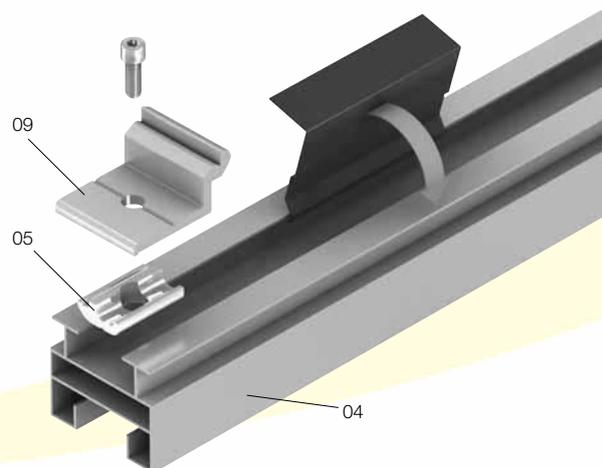


Figure 83: Installing the Anchor Blocks for the Fixing Brackets

7 Installation of Solar Collectors

6. On the left outer edge of the solar collector (01), hook in two fixing brackets (09) into the solar collector profile (a) and push them down on to the mounting rails (b).
Secure the fixing brackets in the anchor blocks using M8x14 cylinder bolts.

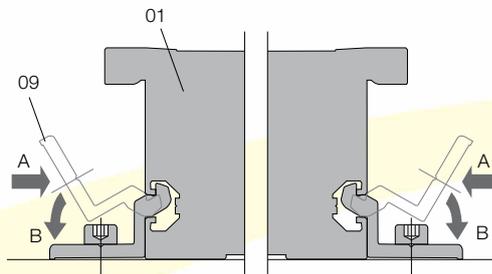


Figure 84: Hook Fixing Brackets in the Solar Collector Profile

7. Secure the solar collector using two further fixing brackets on the opposite side:

- Place anchor blocks in the mounting rails
- Hook fixing brackets into the solar collector
- Secure using cylinder bolts M8x14

8. Place the compression fitting (11) on the connector of the first solar collector.

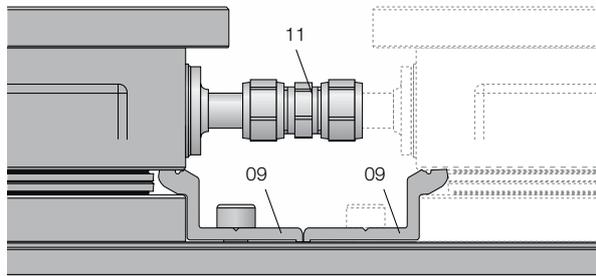


Figure 85: Align Anchor Block for Additional Fixing Brackets

9. Hook two further mounting hooks into the lower mounting rail, see Figure 82, Positioning the Mounting Hooks.

10. Place another solar collector on the mounting rail/mounting hooks and remove the carry handles.

11. Place anchor blocks for the second solar collector in the mounting rail and align so that the fixing brackets can be fixed finally side by side.

12. Install fixing brackets into the solar collector profile and push them down onto the mounting rails.

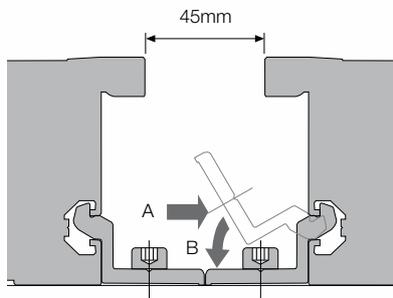


Figure 86: Hook Fixing Brackets in the Solar Collector Profile

13. Push the second solar collector up to the first solar collector until the ends of the fixing brackets touch using cylinder bolts M8x14.

Note:

Take care with compression fitting! Guide the second solar collector's connector into the compression fitting!

14. Continue in the same way to install additional solar collectors.

Important:

Following installation the collectors must be covered, to stop solar radiation reaching them, until completion of filling and commissioning.

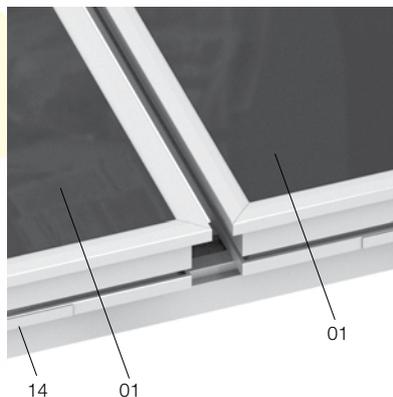


Figure 87: Align Second Solar Collector

Important:

All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the solar primary circuit.

Plastic pipe must NOT be used for any part of the solar primary circuit.

8 Hydraulic Connections

8.1 Compression Connection, Straight

1. Tighten the nuts on the compression connection (11).

Caution:

Apply opposite force when tightening the compression connection, otherwise the pipes on the solar collector can be damaged!

2. After successfully checking the seal of the solar collectors, place thermal insulation (12) around the hydraulic connection, and remove the protective film from the adhesive strip to secure it in place.
3. Continue in the same way to install additional solar collectors.
4. Inlet connection (A) and outlet connection (B) for the solar collector field is left to the installer to choose.

Caution:

Locate the solar collector temperature sensor (19) in the sensor pocket next to the Outlet (flow) connection of the collector array.

5. Push back the thermal insulation on the solar collector connection kits, place the compression connections onto the connectors and secure.
6. Take the temperature sensor seal (13) out of the solar collector hole next to the outlet (flow) connection, pierce the centre and push it over the temperature sensor. Finally, guide the temperature sensor fully into the sensor pocket of the solar collector and seal by re-inserting the temperature sensor seal.

Caution:

Push the solar collector temperature sensor to the end of the hose sleeve so that the correct measuring point is reached.

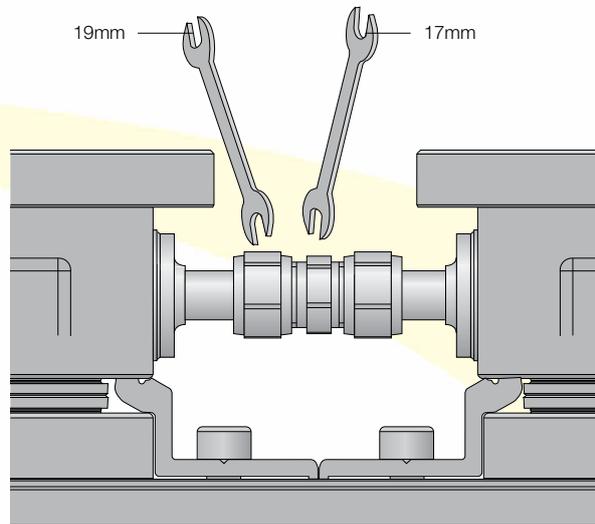


Figure 88: Hydraulic Connection

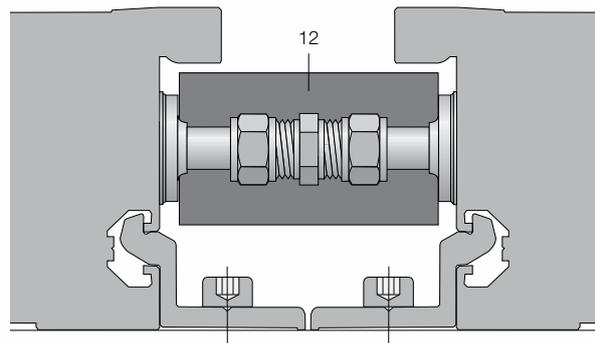


Figure 89: Fit Thermal Installation

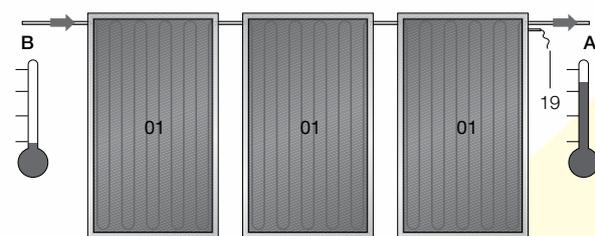


Figure 90: Solar Collector Field Attachment

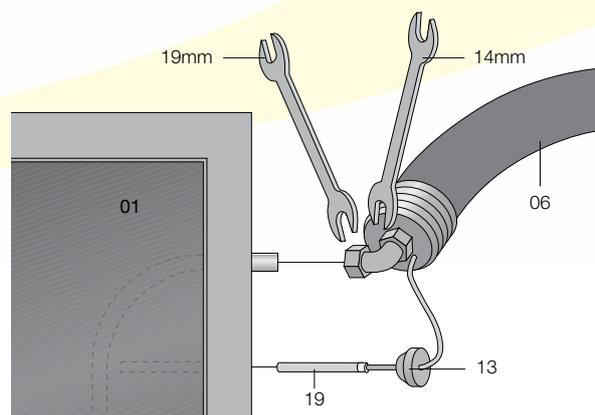


Figure 91: Connection of Temperature Sensor

Important:

All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the solar primary circuit.

Plastic pipe must NOT be used for any part of the solar primary circuit.

8 Hydraulic Connections

8.2 Compression Connection, Landscape Systems Only

1. Fit the two 15mm compression elbows supplied on to the two adjacent solar connectors using the 15/12mm reducing sets provided in the kit. Turn the elbows so that the openings face each other as shown. Do not fully tighten at this stage.
2. Measure a length of 15mm copper pipe (not supplied) required to connect the two elbows. Cut the 15mm pipe to the required length using a pipe cutter.
3. Remove the elbows from the collectors. Fit the insulation onto the copper pipe, fit the pipe between the elbows and refit them to the collector connectors.
4. Tighten the compression elbows.
Caution:
Apply opposite force when tightening the compression connections, otherwise the pipes on the solar collector can be damaged!
5. After successfully checking the seal of the solar collectors fit the thermal insulation on the pipe and elbows.
6. Continue in the same way to install additional solar collectors.

Important:

All system pipe connections must use compression fittings with brass olives. Soft soldered joints must NOT be used on the solar primary circuit.

Plastic pipe must NOT be used for any part of the solar primary circuit.

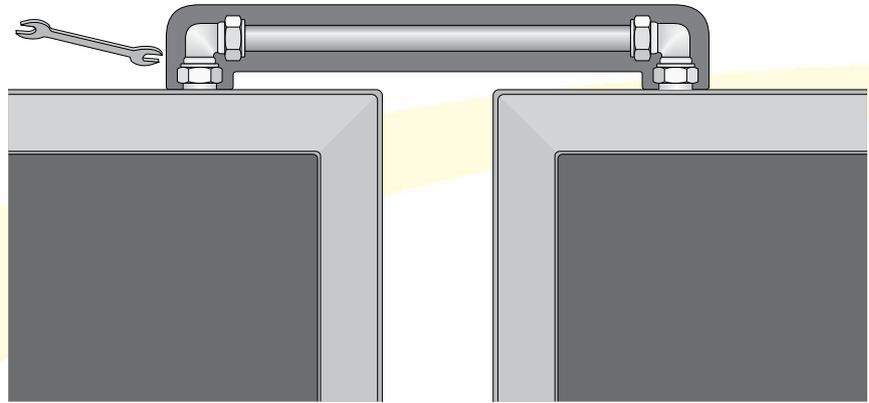


Figure 92: Hydraulic Connection, Landscape Installation

9 Roof Penetrations

9.1 Roof Penetration

For On-Roof Systems Only

1. There are several options for making weathertight roof penetrations, including:

Ventilation Tiles

Increase the opening in the ventilation tile to allow the Insulated pipes to pass through, or remove the grill inserts if possible.

Locate the ventilation tiles adjacent to the collector connections.

Lead Flashings

Remove the tiles adjacent to the collector connections. Drill a 25mm hole in the tile using a diamond tipped bit.

Locate the flashing below the drilled tiles, with the copper pipe passing through the drilled hole

'SolarDek' Flashings

These have a coated lead base with a silicone centre section that is cut off to suit the diameter of the pipe.

These can replace the tiles adjacent to the collector connections.

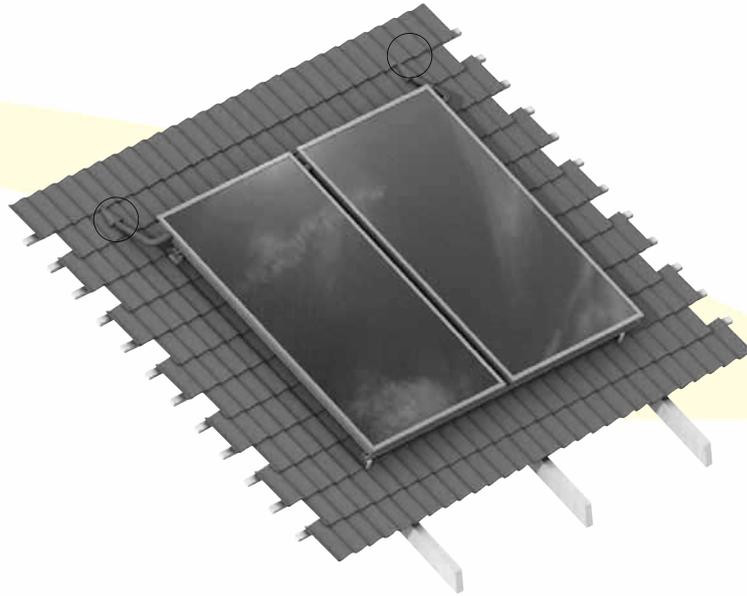


Figure 93: Solar Collector Field Attachment for On-Roof Systems

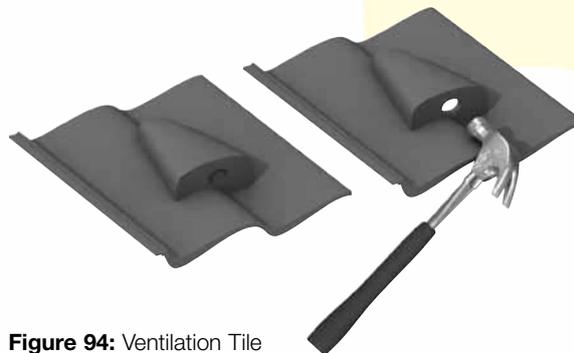


Figure 94: Ventilation Tile

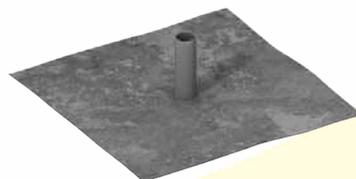


Figure 95: Lead Flashing

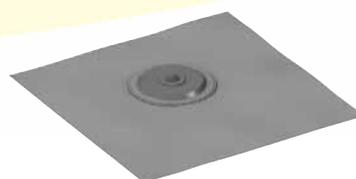


Figure 96: SolarDek Flashing

9 Roof Penetrations

2. Push the thermal insulation for the solar collector connection kits (06) up to the solar collector.

For Ventilation Tiles

Pass the insulated pipes through the opening in the ventilation tile for connection inside the roof space.

For Lead Flashings

Cut the insulation and fit over the copper pipe on the flashing. Pass the flexible connection pipe through the copper pipe/flashing for connection inside the roof space.

For 'SolarDek' Flashings

Cut the insulation to fit on to the silicone seal. Cut the silicone seal to give the required diameter hole for the pipe. Pass the pipe through the silicone seal for connection inside the roof space.

3. If the substructure is punctured, the roof covering must be re-sealed afterwards! Guide the connection pipes into the correct position through the waterproof membrane. The seal can be restored by attaching overlapping strips of waterproof membrane, for example. Overlap must be a minimum of 100mm!

For In-Roof Systems Only

4. The flow and return connection pipes can be located beneath the top flashing where they can pass through the waterproof membrane.

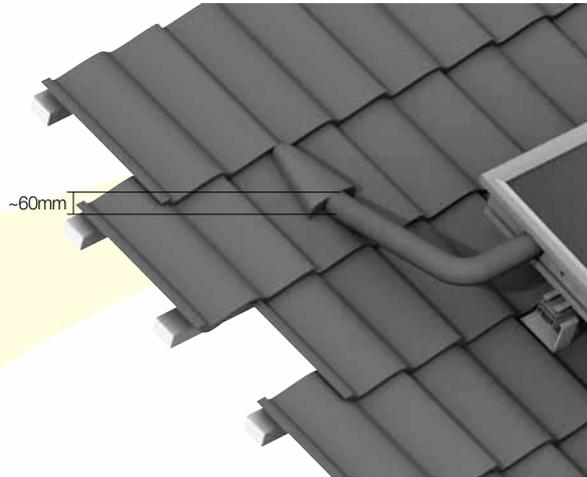


Figure 97: Detail View of Solar Collector Field Connection - On-Roof Systems

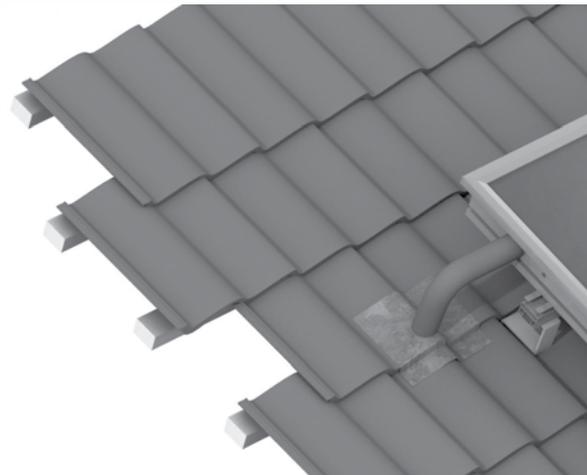


Figure 98: Detail View of Solar Collector Field Connection - On-Roof Systems

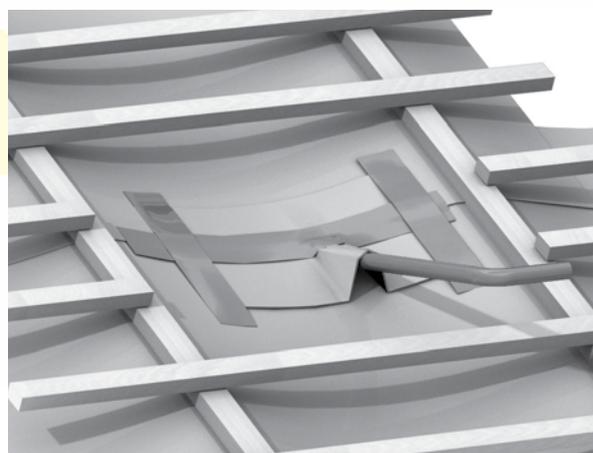


Figure 99: An Example of Passing Through the Waterproof Membrane

10 Commissioning

Commissioning Check List

Grant Solar Thermal	
User Instructions explained and handed over?	Yes/No
Decommission schedule for collector and cylinder left on site?	Yes/No
Installation and maintenance instructions left on site?	Yes/No
Specialist maintenance schedule (including frequency, maintenance and list of parts to be replaced during normal maintenance) left on site?	Yes/No
System drawing indicating hydraulic, valve and electrical connections?	Yes/No
Store commissioning certificate completed and signed?	Yes/No
Conformity declarations for EU directives?	Yes/No
All documentation to be kept visibly near store protected from heat, water and dust. Name of location where documentation is left:	
Glazing format of solar collector:	Flat
Absorber type:	Selective
Net absorber or aperture area.	2.14m ² Absorber
Copy of EN 12975 conformity certificate left on site?	Yes/No
What is max design temperature.	°C
Will system prevent collector overheating?	Yes/No
Manufacturer's name:	Grant UK
Unique serial no:	
Maximum stagnation temperature of collector.	177 °C
Maximum design pressure of collector.	10 Bar
Maximum design pressure of pre-heat store exchanger.	10 Bar
Primary pressure limit of weakest component.	Bar
System pressure setting adjusted when cold.	2 Bar
Minimum allowable primary system pressure/level before user action required.	0.5 Bar
Procedure for user to follow if primary pressure/level is below limit.	
Location of primary system pressure gauge.	Pump station
Frequency of regular test of pressure safety device:	Yearly
Location of pressure safety device.	Pump station
Location of electrical fused isolating switch.	
Fuse rating.	3 Amps
Electrical controls and temperature sensors operating correctly?	Yes/No
Non-solar DHW heating fitted with a thermostat responding to the solar pre-heat store?	Yes/No
Differential pump control setting.	35 °C
Hysteresis setting about differential switching points.	3 °C
Expansion vessel pre-charge.	2.5 Bar
Expansion vessel capacity.	Litres
Expansion capacity suitable to be inherently secure?	Yes/No
Written warning left on site if there's potentially no automatic resumption of normal operation after stagnation?	Not required
Lowest ambient temperature of primary system without freeze damage.	-25 °C
The heat transfer fluid provides freeze protection to.	-25 °C
Type of transfer fluid.	Water/Glycol
Maximum Ambient temp for pump.	30 °C
Minimum ambient temperature for pump.	0 °C
Circulation rate setting. Litres per minute	
Noise at full circulation acceptable.	Yes/No
Direction of circulation through collector heat exchanger matched to sensor positions?	Yes/No

10 Commissioning

Commissioning Check List

Grant Solar Thermal	
Solar pre-heat store type.	Combined with DHW/ Separate from DHW
Solar primary heat exchanger type.	Copper/ Steel/ Plain/ Ribbed
Solar primary heat exchanger area.	m ²
Volume of dedicated solar pre-heat.	Litres
Location of DHW isolation valve.	
Method of anti-scalding in DHW distribution.	
Pump control/thermostatic mixer valve	
Location of digital temperature gauge fitted to monitor risk of DHW overheating.	
Limescale risk to heat exchanger.	Low/ Medium/ High
Limescale control in heat exchanger:	Cleaning hatch/ Thermostat on primary circulation
Expected annual delivered solar energy to taps.	kWh
Expected annual solar fraction of DHW.	per cent
Method of performance calculation.	SAP2005/SAP2009 Other
Daily DHW load assumption	Litres per day at °C
Date of site visits for bacterial, water quality and access risk assessments.	
Commissioned by	
On behalf of	
Date system commissioned and handed over	
Signature of commissioning engineer	
Signature of user to confirm receipt and understanding (optional)	

11 Maintenance

Grant Solar Thermal systems require only basic maintenance in order to ensure that they continue to give efficient trouble-free operation. The following procedures should be carried out annually.

WARNING

Before commencing any work on a solar thermal system cover the collectors and allow the system to cool down.

11.1 System checks

Isolate the electrical power supply to all system controls.

Check the following:

1 Collectors

Collector fixings - ensure that they are secure – retighten if necessary.

Condition of collectors – check glazing is undamaged and clean glass to remove any dirt deposits if necessary.

Pipe connections – check for any evidence of leaks and rectify as necessary.

Pipe insulation – check insulation on exposed pipes and replace if damaged.

Collector sensor – ensure it is correctly located and securely fitted.

2 System pipework

Leaks - visually inspect system for any evidence of leaks and rectify as necessary

PRV operation – test by briefly rotating plastic cap on valve to operate.

Pipe insulation – check condition of pipe insulation and replace if damaged.

3 Expansion vessel pressure

Check the charge pressure in the vessel as follows:

- a) Close the isolation valve – on the expansion vessel connection
- b) Open the small Drain cock on the connector and drain off a small amount of solar fluid into a clean container. Keep this fluid to test – see 11.2-Solar fluid below.
- c) Check the air charge in the vessel - refer to the instructions supplied with the Pump Station for correct pressure.
- d) Adjust or re-pressurise the vessel as necessary to achieve the correct pressure. NB. This may require putting additional solar fluid into the system. Refer to the instructions supplied with the Pump Station for system filling guidance.

11.2 Solar fluid

Using the small amount of solar fluid removed from the expansion vessel, carry out the following tests:

- a) Using a Refractometer - check antifreeze concentration and level of protection.
- b) Using suitable litmus indicator strips – check Acidity ph value.

Replace solar fluid as required if either test indicates the fluid is unsuitable.

Safety!

If the replacement of solar fluid is required, and the system filling point (pump station) is located in the roof space, there should be a suitable flat surface on which to stand the filling station, i.e. floor, loft boarding or similar.

11.3 Hot water storage cylinder

- 1 Check as per manufacturer's recommendations (refer to instructions supplied with the cylinder).
- 2 Cylinder sensor - ensure it is correctly located and securely fitted.

11.4 Restarting system

The following procedure should be followed to put the system back into operation:

- 1 System pressure – check cold system pressure (on pressure gauge) is correct for static height of system (refer to the instructions supplied with the Pump Station for details). Top-up or re-fill as required.
- 2 Controls - After reconnecting the power supply to controls, check the following:

Settings on Solar Controller are correct – Refer to Section 12 for details.

Operation of Solar Controller – operate override and check that solar pump starts.

- 3 System flow – with the solar pump running check the volume flow rate and reset as necessary (refer to the instructions supplied with the Pump Station for details). NB. Ensure that correct system volume flow rate is also set in the solar controller.

12 De-commissioning Procedures

If the solar thermal system is to be taken out of use – either temporarily or for a longer period, the following procedure should be followed.

WARNING

Before commencing any work on a solar thermal system cover the collectors and allow the system to cool down. These covers should be removed when the decommissioning procedure is completed.

12.1 System

Isolate the electrical supply to the solar thermal system. Remove fuse from fused isolator and lock off the isolator.

Where the solar thermal system uses a twin (or triple) coil cylinder, switch off the other heat source(s) to the cylinder, e.g. gas or oil boiler, heat pump, etc. Manually close any 2-port valves in either the flow or return pipe(s) from these auxiliary heat sources to the cylinder coil(s).

Allow solar thermal system to cool down. If necessary, draw off hot water from storage cylinder to reduce solar system temperature.

Once cool (i.e. $<50^{\circ}\text{C}$), drain solar fluid from the system, via system drain cock(s), into a suitable container, e.g. the plastic container(s) in which the solar fluid is supplied.

If the system is to be taken out of use permanently, or not to be used for some time, shut off the incoming cold water supply to the cylinder and drain all the water from the cylinder via the drain of cock in the cold supply to the cylinder.

If the twin (or triple) coil cylinder is to be used to provide hot water following decommissioning of the solar thermal system, re-open any 2-port valves in either the flow and return pipe(s) from the remaining heat source(s). Check the settings of all cylinder controls (control and overheat thermostats) and heat source controls (temperature controls and programmers). Switch on the heat source(s) – gas or oil boiler, heat pump, etc. to put the cylinder back into operation.

12.2 Disposal of Solar fluid

The propylene glycol used in the Grant pre-mixed solar thermal system fluid is non-toxic and does not contain any nitrates, phosphates or ammonia. Refer to Section 14.3 for details of the Grant solar fluid.

However, DO NOT dispose of the solar fluid into household drainage system, controlled water, or any other drainage system, e.g. storm drain, sewers, etc.

ONLY dispose of used solar fluid (40% propylene glycol/water solution) in accordance with local regulations – i.e. at a licensed recycling or disposal centre. Check with your local authority for details of disposal facilities in your area.

12.3 Collectors

If the collectors are to be removed from the roof, either temporarily or permanently, a safe method of removal must be employed for working at height, e.g. a tower scaffold or permanent scaffold.

After removal of the collectors, the roof covering should be reinstated and made weatherproof.

If the collectors are to be left in position for a long period (in excess of 30 days), with the system decommissioned and drained of solar fluid, it is advisable to cover them using Grant reflective solar covers – Grant Ref.GS222002 (pack of two).

13 Warranty

The Grant Solar Thermal System Warranty

Dear Customer

You are now the proud owner of a Grant Solar Thermal System from Grant Engineering (UK) Limited that has been designed to give years of reliable, trouble free operation. Grant Engineering (UK) Ltd. Guarantees the manufacture of the system, including all electrical and mechanical components, for a period of twelve months from the date of purchase, provided that the system is installed in full accordance with the installation instructions provided. This will be extended to a period of five years if the system is registered with Grant UK within thirty days of installation and it is serviced at twelve month intervals. See Terms and Conditions below.

Important

Please register your Grant Solar Thermal system with Grant UK within thirty days of installation, as follows:

Either

- a) visit www.grantuk.com and follow the links to the 'Householder Zone', or
- b) go to www.grantuk.com/solarthermalregistration.aspx,

where you can register your Solar Thermal system for a further four years warranty (giving five years from the date of purchase). This does not affect your statutory rights.

Breakdown during the Manufacturer's Warranty

If your Grant Solar Thermal System should fail within the first five years of the date of purchase you must contact Grant Engineering (UK) Limited, who will arrange for the repair under the terms of their Warranty, providing that the system has been correctly installed and commissioned, serviced (if older than twelve months) and the fault is not due to misuse, or the failure of any system components not supplied by Grant UK (e.g. pipework, hot water cylinder, etc.), or the incorrect setting of the system controls. This extended five year warranty only applies if the system is registered with Grant UK within thirty days of installation.

In the first Instance:

Contact your installer to ensure that the fault does not lie with any part of the installation or any other components

not supplied as part of the Grant Solar Thermal System, or any incorrect setting of the system controls.

If a Fault is Found:

Ask your installer to contact Grant Engineering (UK) Limited Service Department on 01380 736920 who will arrange for a qualified service engineer to attend to the fault.

Free of Charge Repairs:

During the first five years no charge for parts or labour will be made providing that the Solar Thermal System has been installed and commissioned correctly in accordance with the manufacturer's instructions, serviced at twelve month intervals and the system was registered with Grant UK within thirty days of installation. Proof of 'purchase' date must be provided upon request.

Chargeable Repairs:

A charge will be made if the cause of the breakdown is due to any of the following:

- **Faults caused by the plumbing or heating system, external electrics or any external components.**
- **The Grant Solar Thermal System has not been commissioned, or serviced, in accordance with the Installation & User manual supplied with the system.**
- **The system has been installed for over five years.**

Remember before you contact Grant:

Please register the Solar Thermal System with Grant Engineering UK Ltd within thirty days of installation.

Terms of Manufacturer's Guarantee

1. The Grant Solar Thermal System guarantee starts from the date of purchase.
2. All electrical and mechanical components supplied with the Grant solar Thermal System (including the system circulating pump) are guaranteed for a period of five years. The Grant Warranty does not cover any 'mixed' systems – i.e. where the collectors, pump station, solar fluid or controller(s) were not supplied by Grant Engineering UK Ltd.

3. This guarantee does not cover breakdowns caused by incorrect installation, neglect, misuse, accident or failure to operate the system in accordance with the Installation and User Instructions provided.
4. The Solar Thermal System is registered with Grant Engineering UK Ltd within thirty days of installation. Failure to do so does not affect your statutory rights.
5. The Grant Solar Thermal System must be installed by a competent installer and in full accordance with the relevant Codes of Practice, Regulations and Legislation in force at the time of installation.
6. The Grant Solar Thermal System components must not have been modified or tampered with.
7. The installation must be serviced every twelve months as per the Installation & User Instructions provided. Receipts should be kept as proof.
8. All claims under this guarantee must be made to Grant Engineering (UK) Ltd prior to any work being undertaken. Proof of purchase and date of installation must be provided on request. Invoices for call out/repair work by any third party will not be accepted unless previously authorised by Grant Engineering (UK) Ltd.
9. This guarantee is transferable providing the installation is serviced prior to the dwelling's new owners taking up residence. Grant Engineering (UK) Ltd must be informed of the new owner's details.
10. Grant Engineering (UK) Ltd will endeavour to provide prompt service in the unlikely event of a problem occurring, but cannot be held responsible for any consequence of delay however caused.
11. This guarantee applies to Grant Solar Thermal Systems installed on the UK mainland, Isle of Man and Channel Islands only. Provision of in-warranty cover elsewhere in the UK is subject to agreement with Grant Engineering (UK) Ltd.



EFFICIENT HEATING SOLUTIONS

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