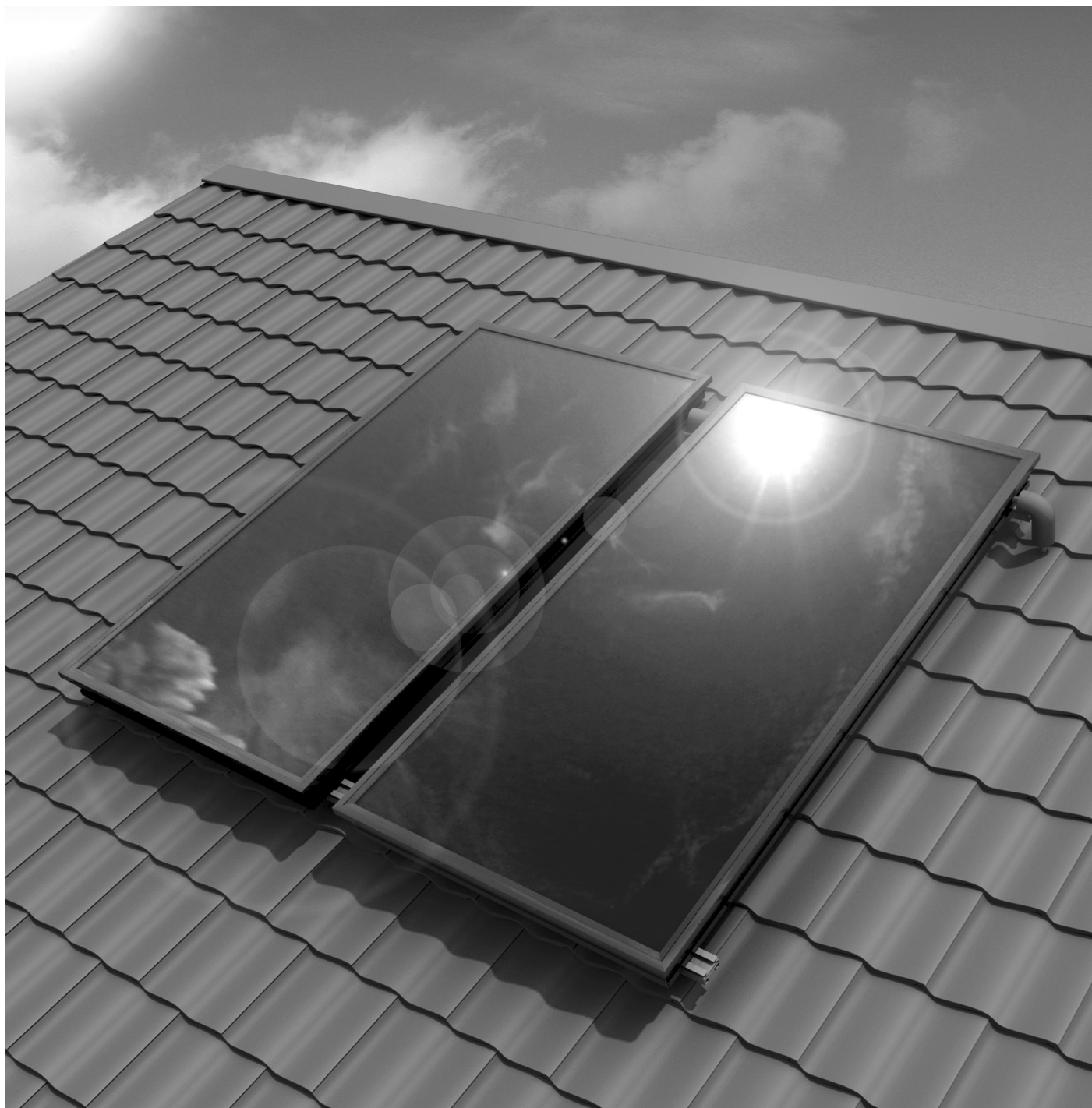


Grant Solar Thermal Systems

On-Roof, Flat Roof and In-Roof Systems

Installation and User Instructions



IMPORTANT NOTE FOR INSTALLERS

These instructions are intended to guide installers on the installation, commissioning and servicing of Grant Sahara solar collectors. After installing the heat pump, leave these instructions with the user.

SERVICING

The solar collectors should be serviced at least every twelve months. Refer to Section 11 of these instructions for further information.

PRODUCT CODES COVERED

These instructions cover the installation of the Grant Sahara Solar Collector (product code: GS222773C) as part of a number of different kits. The various kits available provide on-roof, flat roof and in-roof solutions, with different orientations and quantities of collectors being considered.

Please contact Grant UK for information on the various Solar Thermal Collector kits available.

Tel: +44 (0)1380 736920, Email: info@grantuk.com

SPECIAL TEXT FORMATS

The following special text formats are used in these instructions for the purposes listed below:

! WARNING !

Warning of possible human injury as a consequence of not following the instructions in the warning.

! CAUTION !

Caution concerning likely damage to equipment or tools as a consequence of not following the instructions in the caution.

! NOTE !

Used for emphasis or information not directly concerned with the surrounding text but of importance to the reader.

System Options

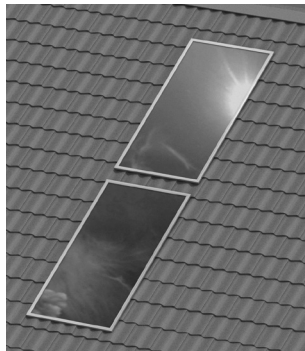
GRANT SAHARA

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

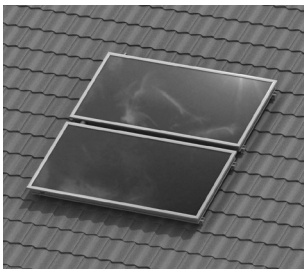
ON-ROOF



Portrait (side by side)

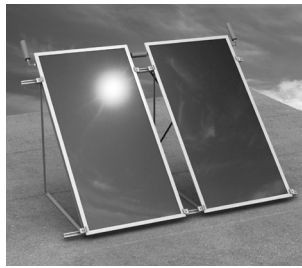


Portrait (one above other)

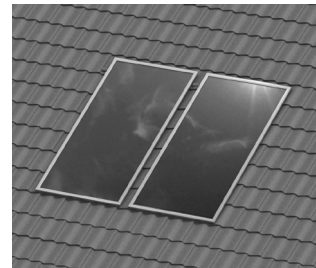


Landscape (one above other)

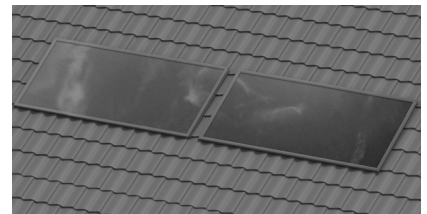
FLAT ROOF



IN-ROOF



Portrait (side by side)



Landscape (side by side)



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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 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.

1.5 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 IET 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.

! NOTE !

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.

1.6 LIGHTNING PROTECTION

In most cases the number of thunderstorm 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.

1.7 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)

1.8 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 1-1).

Table 1-1: 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
- Materials required to install fireproof membrane (if required). Refer to Sections 6.2, 6.3 and Appendix C for further information.

1.9 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.

1.10 TECHNICAL SPECIFICATION - COLLECTORS

Table 1-2: Solar collector specification

Collector Specification	
Collector type	Flat plate
Frame material	Aluminium
Frame finish	Bronze anodised
Glass type	ESG, Durasolar P+ Sandy
Glass thickness	3.2 mm
Overall dimensions (h x w x t)	2043 mm x 1143 mm x 80 mm
Weight (empty)	40 kg
Solar fluid content	1.6 litres
Gross collector area	2.34 m ²
Aperture/absorber area	2.13 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 (89.4775 mph)
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_0	0.826 (82.6%)
Heat loss coefficient (based on aperture area) a_1	4.441 W/(m ² K)
Second order heat loss coefficient (based on aperture area) a_2	0.008 W/(m ² K ²)
Installed capacity (per collector) **	1.491 kW _{th}
Effective thermal capacity	12.620 kJ/(m ² K)
Lowest ambient temperature of primary system without freeze damage	-23°C
Heat transfer (solar) fluid provides freeze protection to:	-23°C

* Test conditions – Irradiance 1000W/m² Ambient temperature 30°C / ** Based on the recommend conversion factor of 0.7.

2 PACKAGE CONTENTS

2.1 STANDARD INSTALLATION KITS

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

Table 2-1: 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 user instructions	1	1	1	1	1
On-roof installation					
Roof anchor*	Determined from wind uplift calculation**				
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 (refer to Section 4.2 - profiled tiles, Section 4.3 - flat tiles and Section 4.4 - slate tiles).

** For installations complying with MCS requirements, the quantity of roof anchors MUST be calculated using the method given in MCS012 based on the factors relating to the site in question.

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

Table 2-2: 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
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
Torx screwdriver bit	1	1	1	1	1
Installation and user instructions	1	1	1	1	1

*** May be supplied as one tray

Table 2-3: Timber battens for 'In-roof' installations (to be supplied by the installer) - minimum lengths (mm)

Batten type	Standard 1 collector kit	Standard 2 collector kit	Standard 3 collector kit	Standard 4 collector kit	Standard 5 collector kit
Bottom batten (30 x 50)	1,460	2,645	3,835	5,025	6,215
Lower middle batten (30 x 90)	1,460	2,645	3,835	5,025	6,215
Upper middle batten (30 x 90)	1,460	2,645	3,835	5,025	6,215
Top batten (30 x 50)	1,460	2,645	3,835	5,025	6,215

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3 DIMENSIONS & FIXING INTERVALS

3.1 ON-ROOF INSTALLATION

Position of Roof Anchors and Mounting Rails

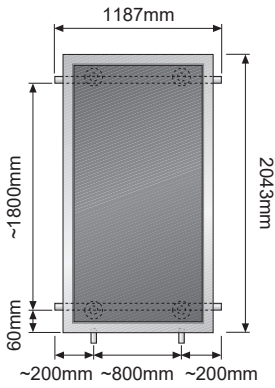


Figure 3-1: 1 collector (portrait)

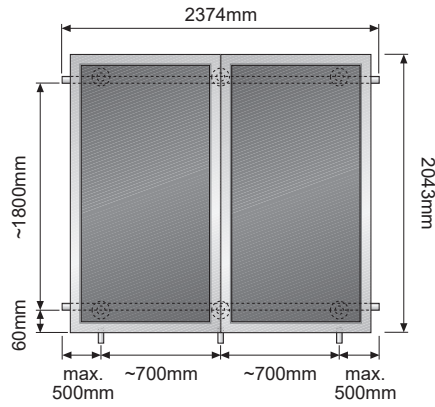


Figure 3-2: 2 collectors (portrait)

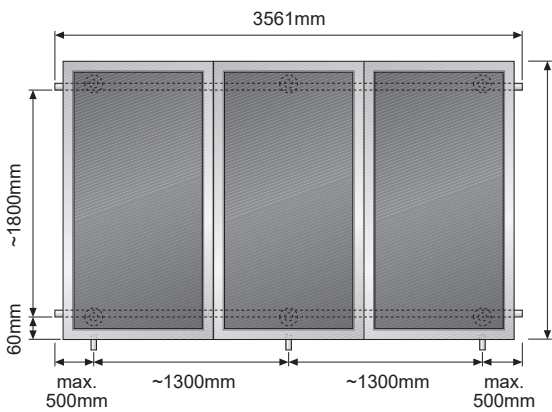


Figure 3-3: 3 collectors (portrait)

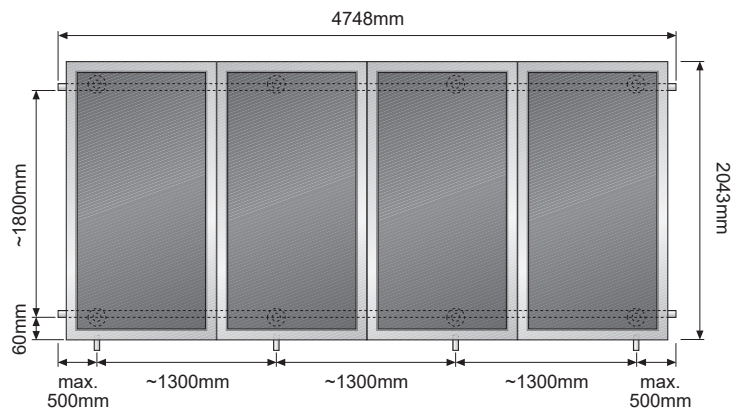


Figure 3-4: 4 collectors (portrait)

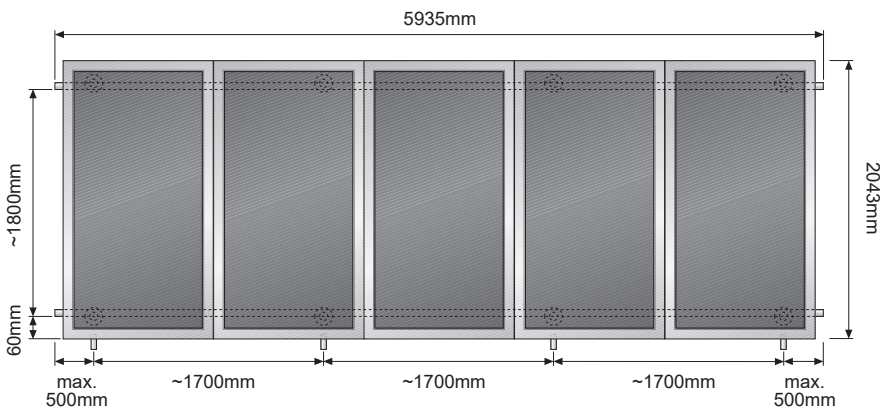


Figure 3-5: 5 collectors (portrait)

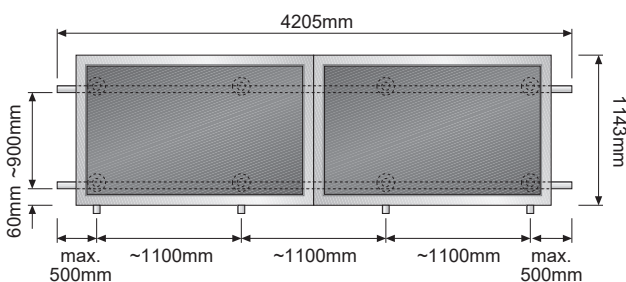


Figure 3-6: 2 collectors (landscape)

3.2 FLAT-ROOF INSTALLATION

Position of Roof Anchors and Mounting Rails

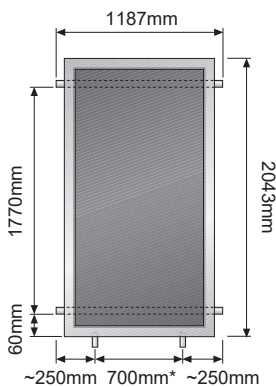


Figure 3-7: 1 collector (portrait)

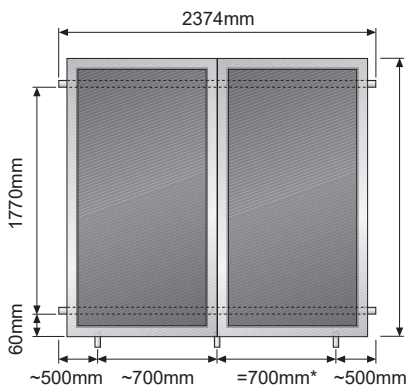


Figure 3-8: 2 collectors (portrait)

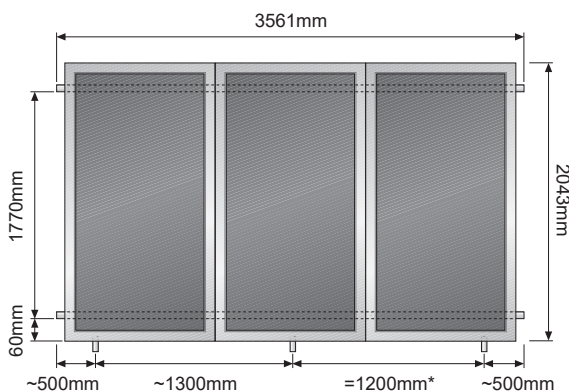


Figure 3-9: 3 collectors (portrait)

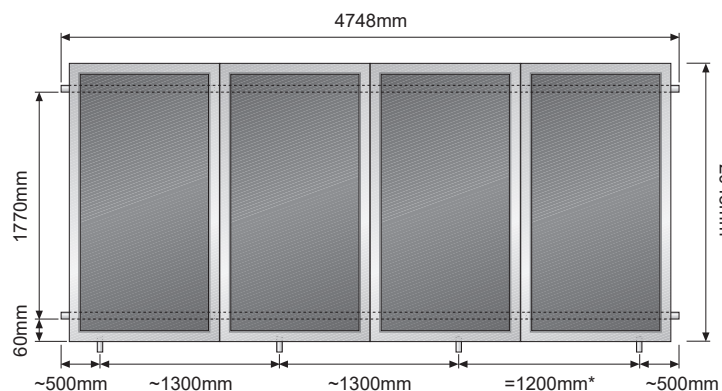


Figure 3-10: 4 collectors (portrait)

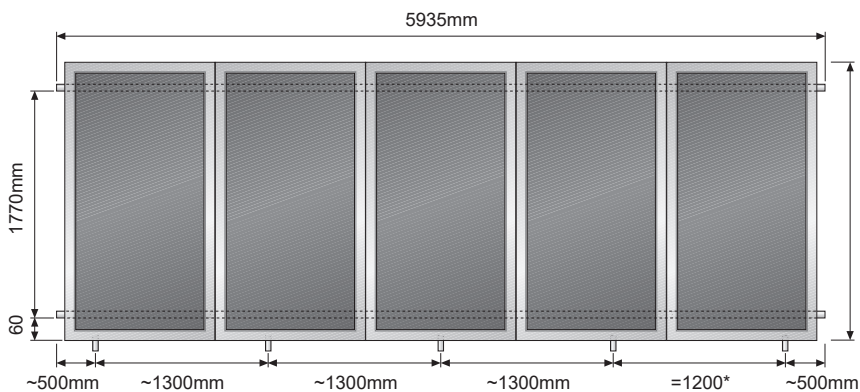
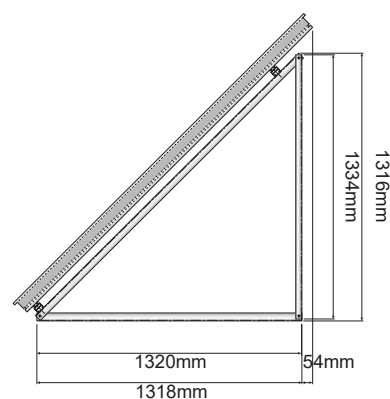


Figure 3-11: 5 collectors (portrait)



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

3.3 IN-ROOF SYSTEM INSTALLATION

Position of Mounting Rails

1-5 Solar Collectors, Portrait, Side by Side

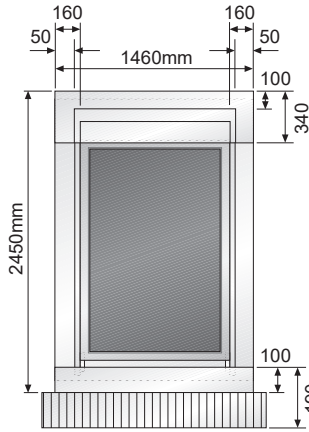


Figure 3-12: 1 collector (portrait)

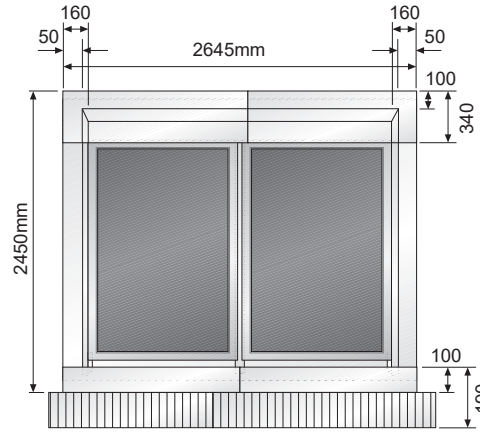


Figure 3-13: 2 collectors (portrait)

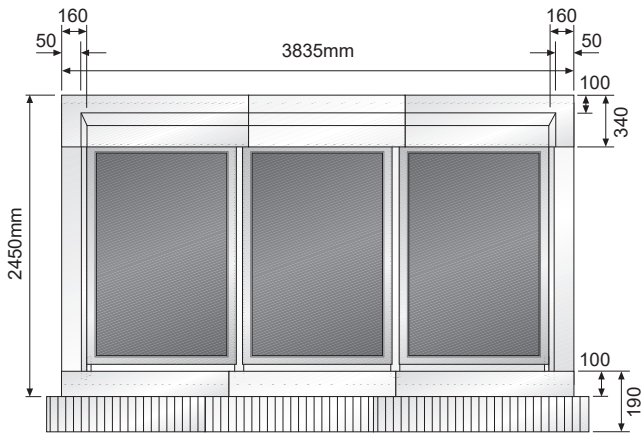


Figure 3-14: 3 collectors (portrait)

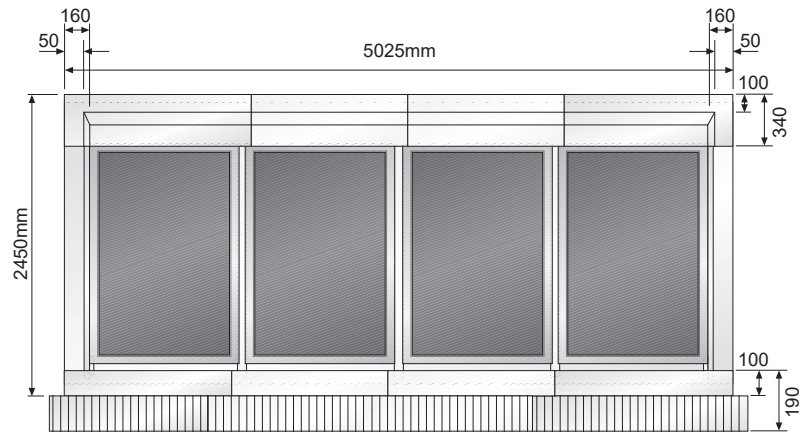


Figure 3-15: 4 collectors (portrait)

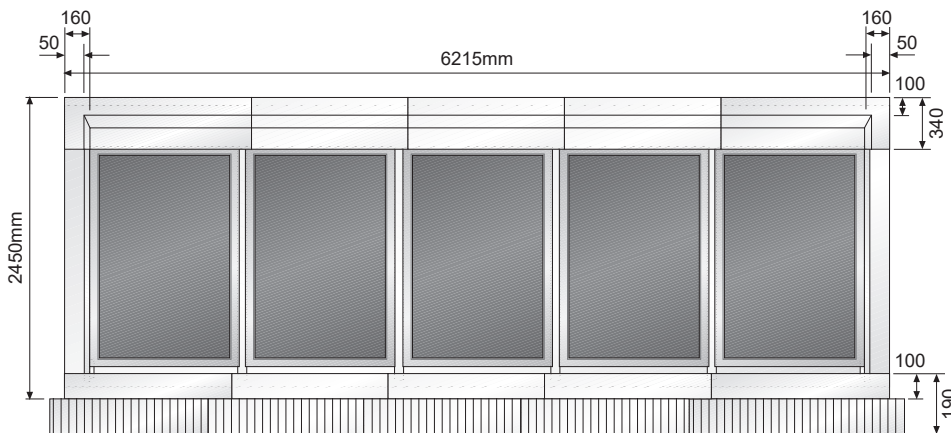


Figure 3-16: 5 collectors (portrait)

Note: Dimensions include cover frame

Position of Mounting Rails

1-5 Solar Collectors, Horizontal, Side by Side

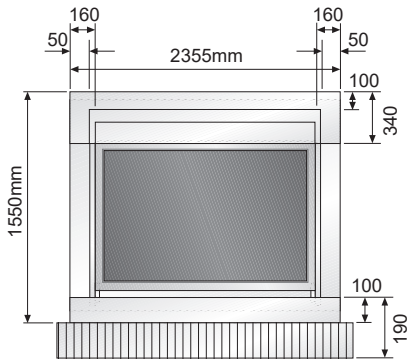


Figure 3-17: 1 collector (landscape)

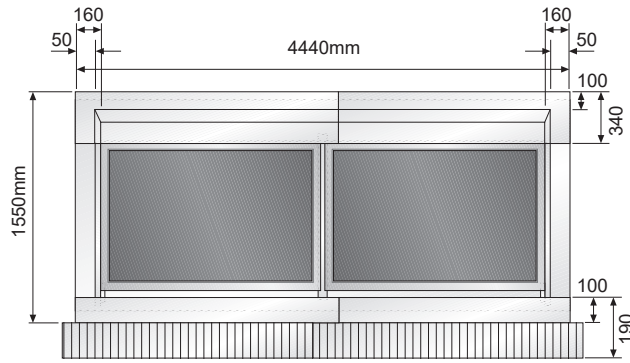


Figure 3-18: 2 collectors (landscape)

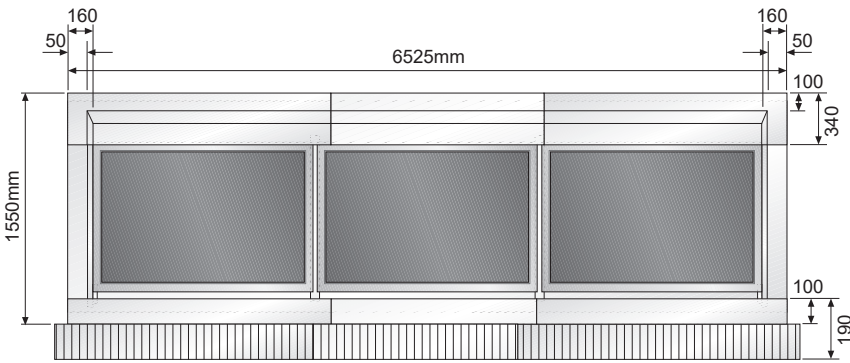


Figure 3-19: 3 collectors (landscape)

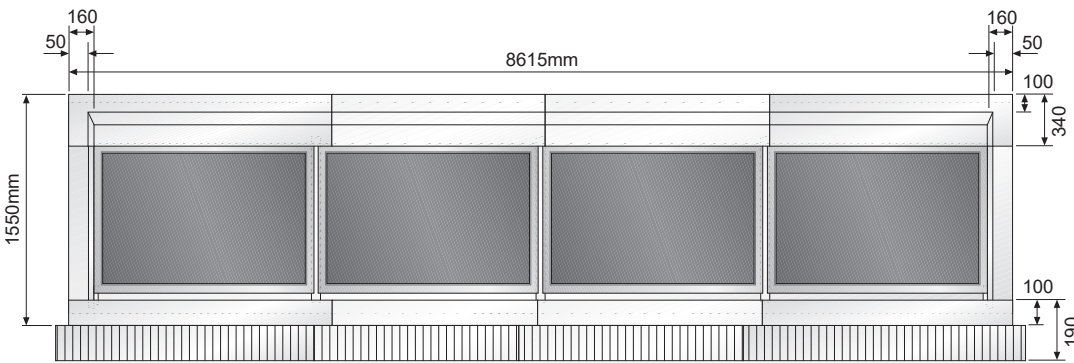


Figure 3-20: 4 collectors (landscape)

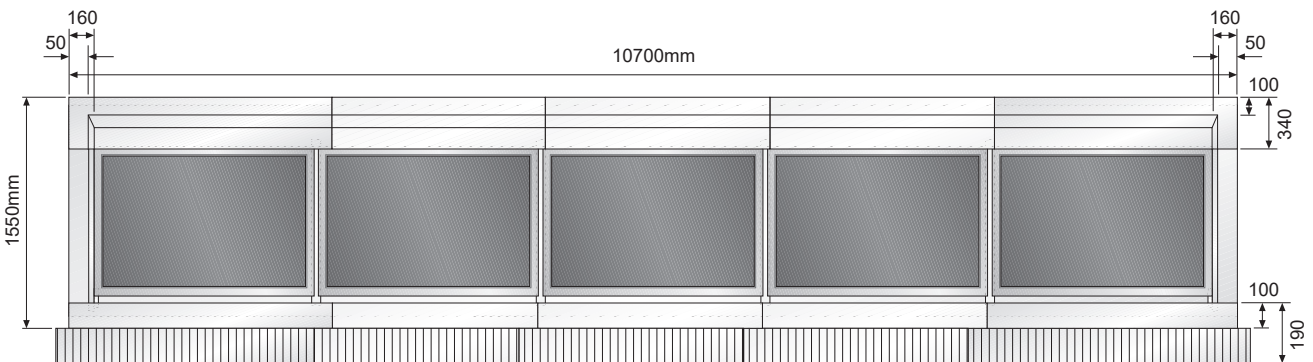


Figure 3-21: 5 collectors (landscape)

Note: Dimensions include cover frame

4 ON-ROOF SYSTEM INSTALLATION

See Section 9 for details of roof penetrations.

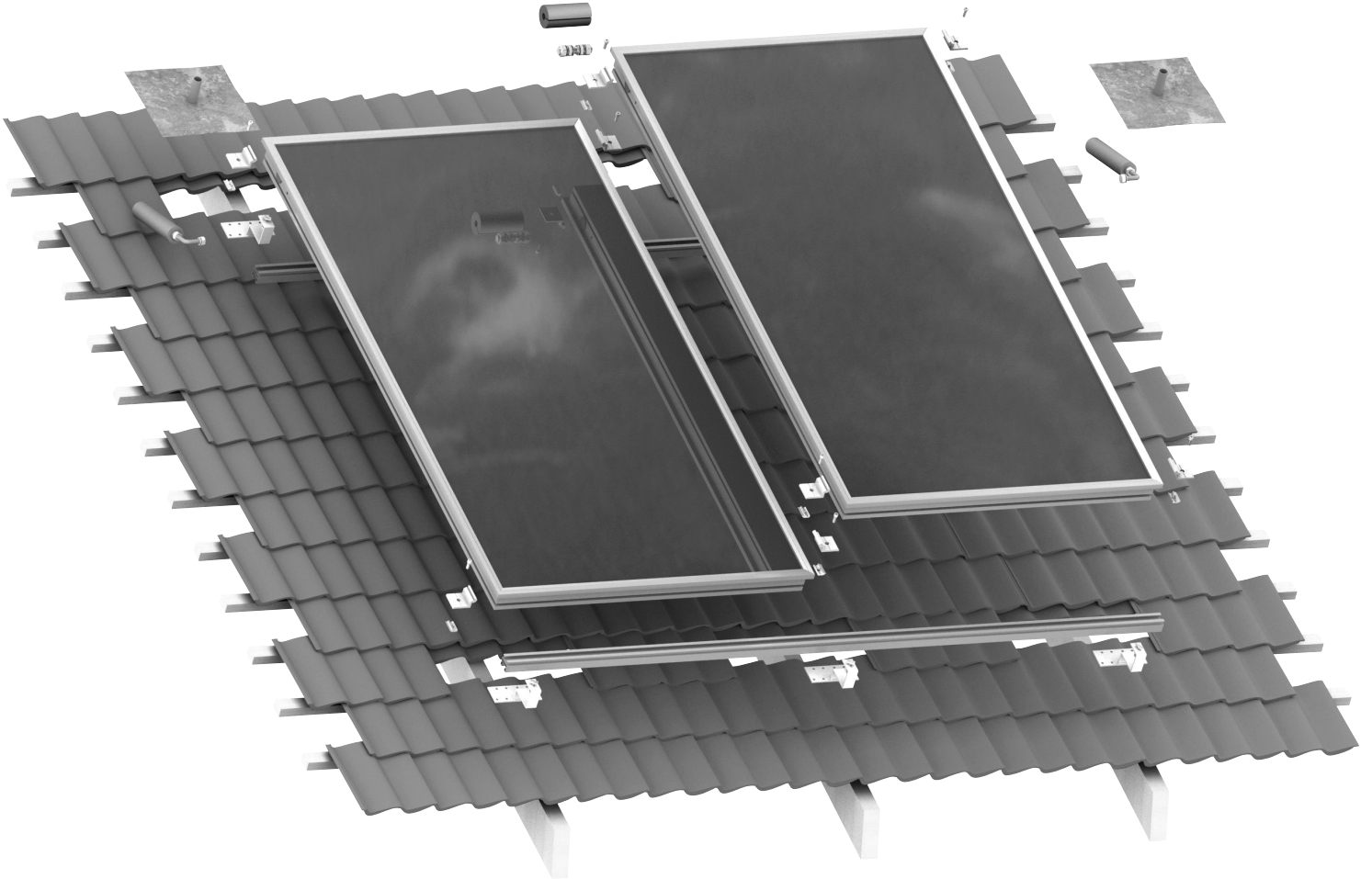


Figure 4-1: On-roof installation

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.

Table 4-1: Key to Figure 4-2

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

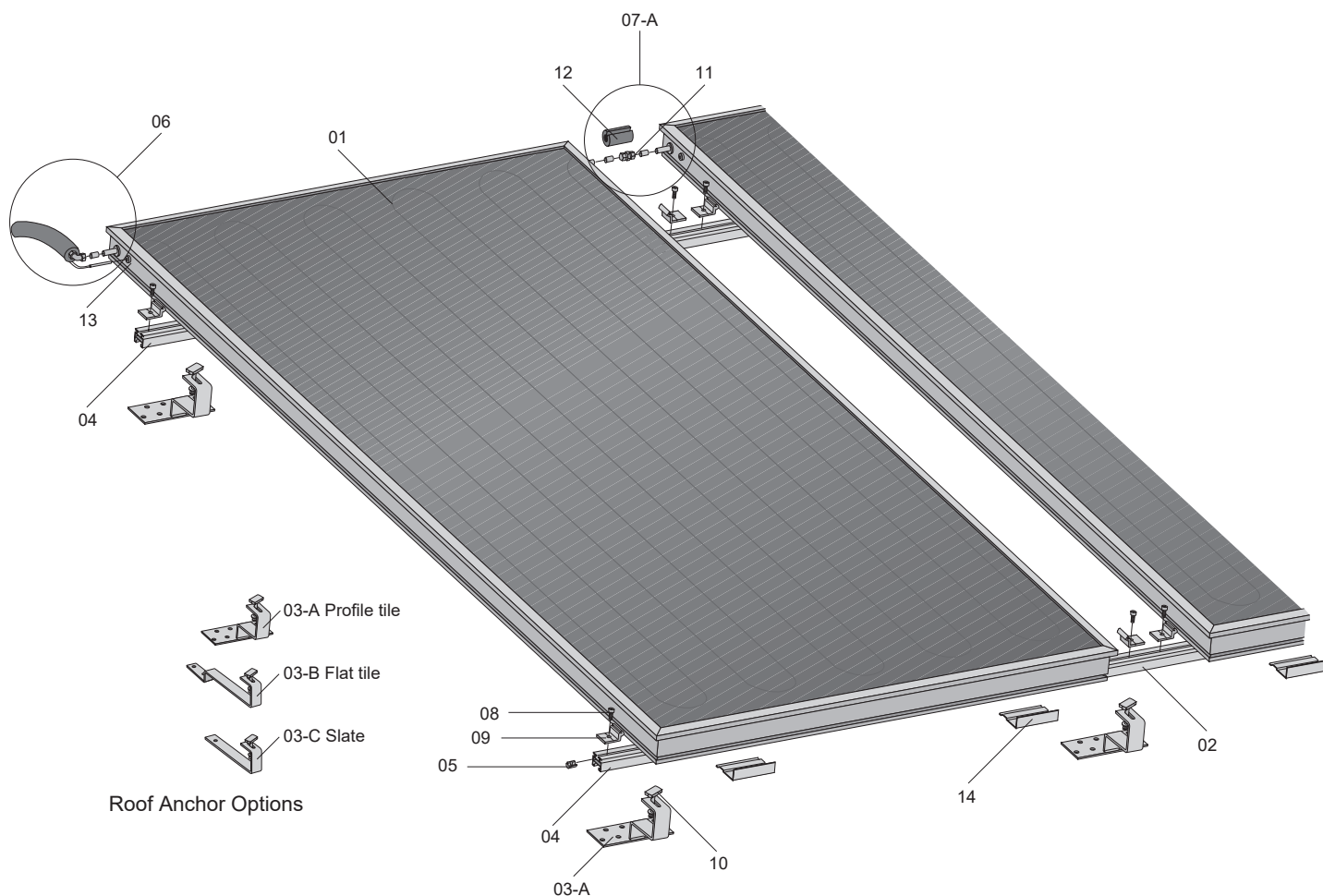


Figure 4-2: Installation Summary, Vertical Solar Collector Layout

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 10, 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.

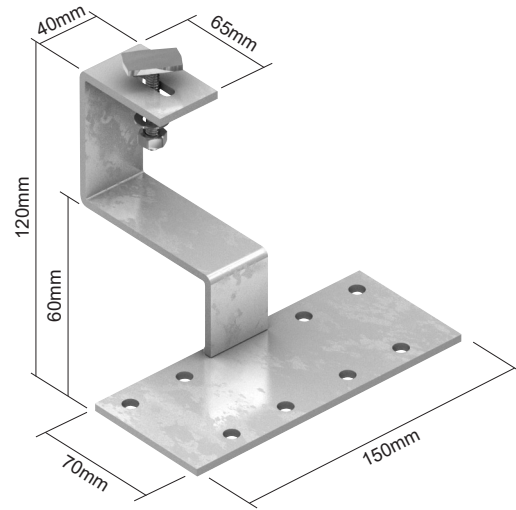


Figure 4-3: Dimensions of Roof Anchor A

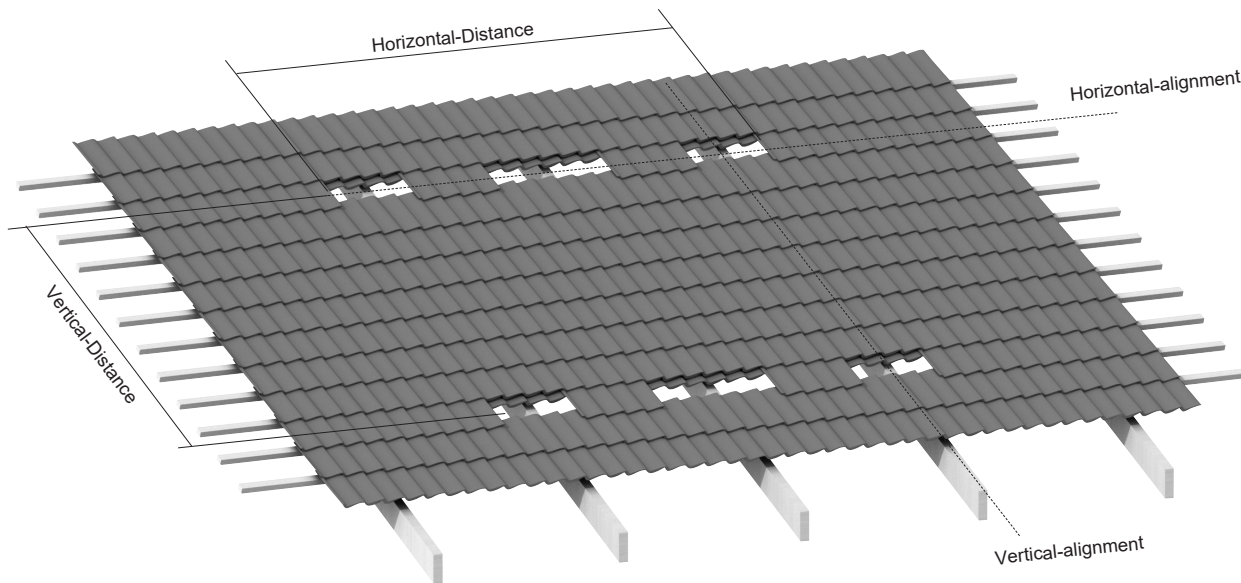


Figure 4-4: Horizontal and Vertical Alignment

3. Refer to Figures 4-2 and 4-5. 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 10, 3.1 On-Roof System installation.

! NOTE !

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

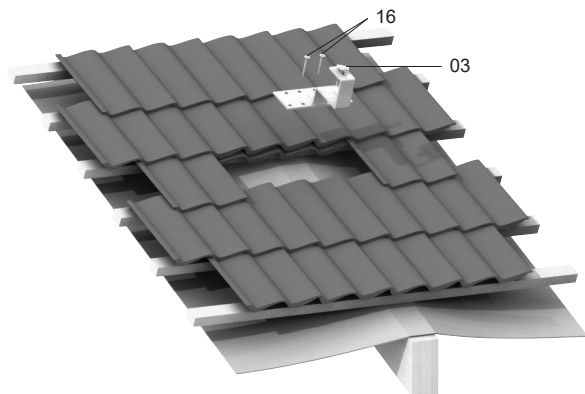


Figure 4-5: Installation of Roof Anchors A

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 10, 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.

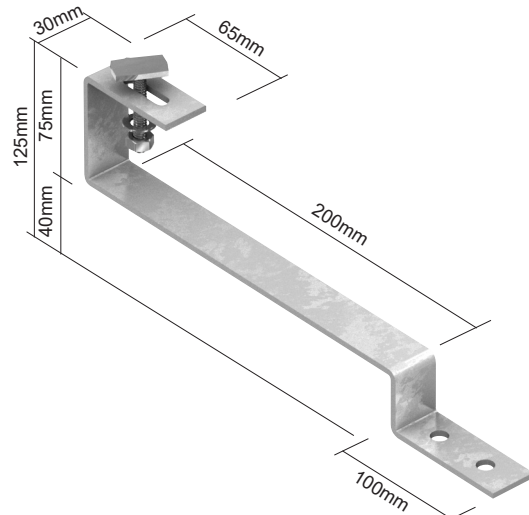


Figure 4-6: Dimensions of Roof Anchor B

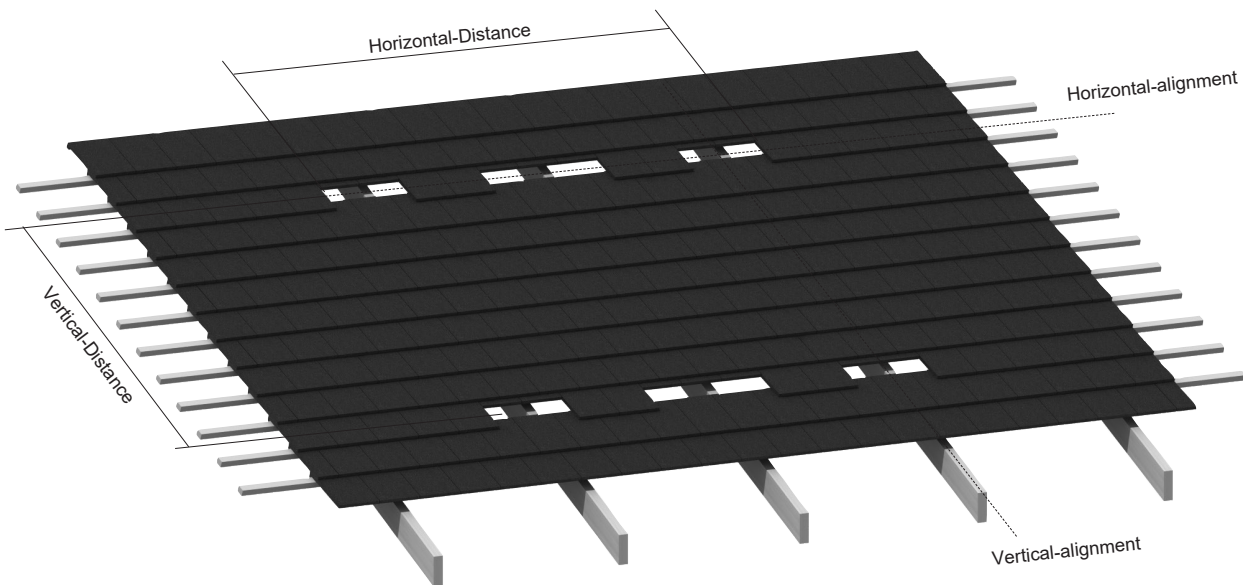


Figure 4-7: Horizontal and Vertical Alignment

3. Refer to Figures 4-2 and 4-8. 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 10, 3.1 On-Roof System installation.

! NOTE !

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

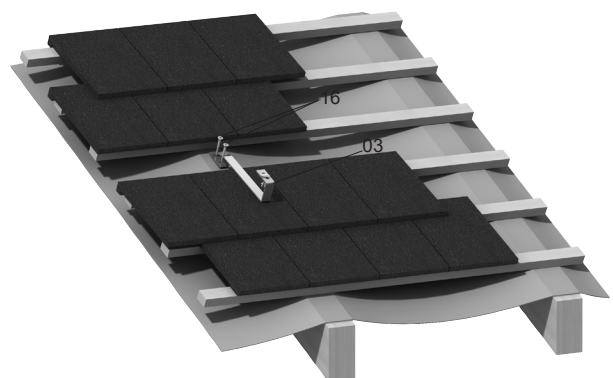


Figure 4-8: Fixing Mounting Battens and Roof Anchors

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 10, 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.

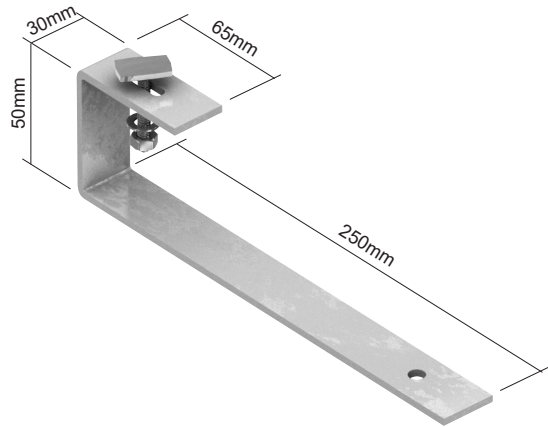


Figure 4-9: Dimensions of Roof Anchor C

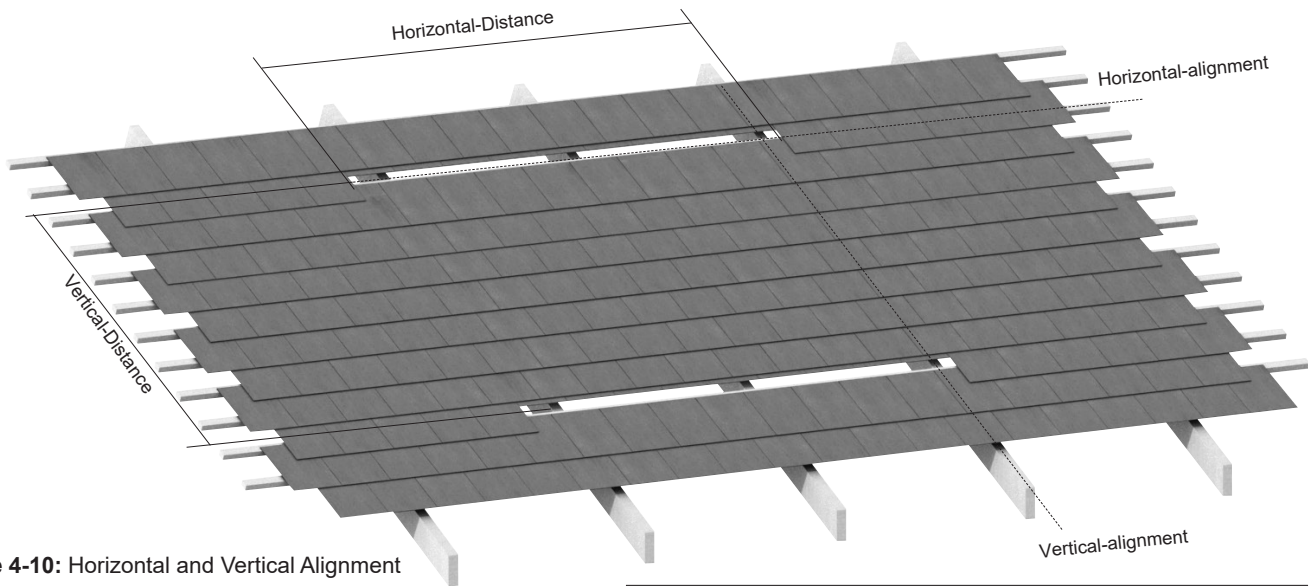


Figure 4-10: Horizontal and Vertical Alignment

! NOTE !

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

3. Refer to Figures 4-11 and 4-12. 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 10, 3.1 On-Roof System installation.

! NOTE !

Roof anchors must be horizontally and vertically aligned.

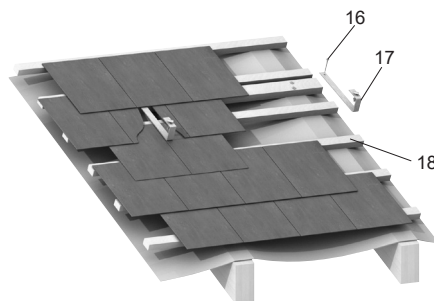


Figure 4-11: Fixing Mounting Battens and Roof Anchors

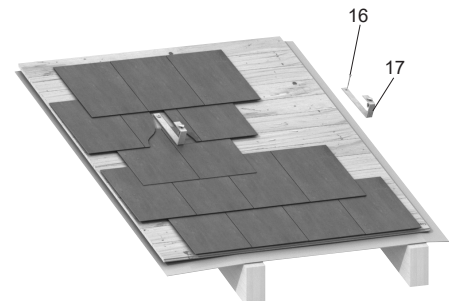


Figure 4-12: Fixing Mounting Battens and Roof Anchors through Sarking

4.5 ALIGNMENT AND FIXING OF MOUNTING RAILS

1. Close the roof covering at the top and bottom.
2. Refer to Figure 4-14. 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: $D1 = D2$ (see Figure 4-15).

Tighten the nuts on the interlocking bolts.

Installation of solar collectors:
See Section 7.

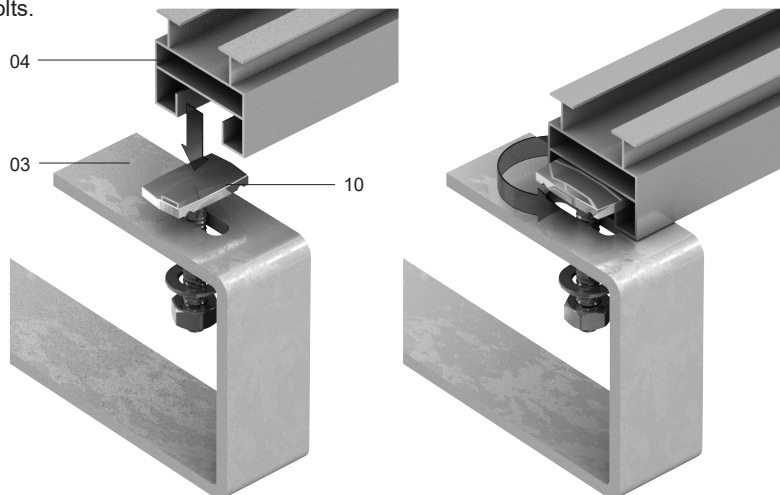


Figure 4-13: Roof Covering with Roof Anchors

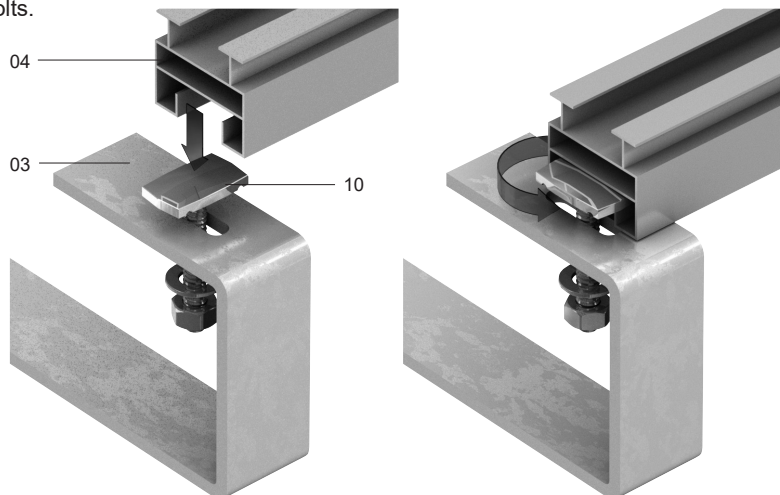


Figure 4-14: Fixing the Mounting Rail

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 4-16.

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 4-17.

Fit the exposed end of the fishplate into the rectangular opening of the second mounting rail. As before, align the threaded hole of the fish plate with the hole in the rail, fit the cylinder bolt and tighten to secure the second rail section to the first. Refer to Figure 4-18.

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

Refer to Section 7 for information regarding the installation of the solar collectors.



Figure 4-15: Aligning the Mounting Rail



Figure 4-16: Installing the Fishplate



Figure 4-17: Fixing the Fishplate



Figure 4-18: Joining Mounting Rails

5 FLAT ROOF SYSTEM INSTALLATION

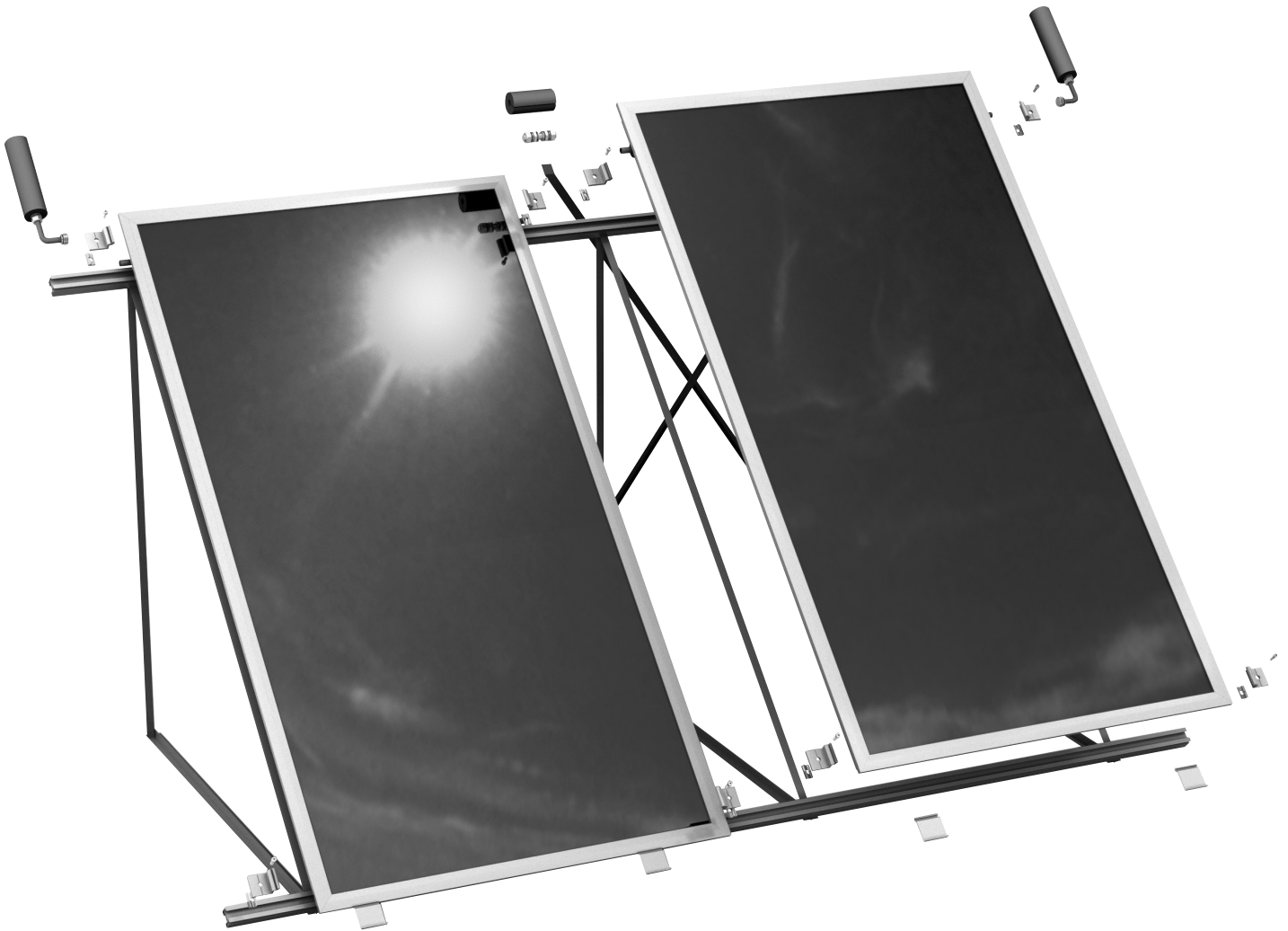


Figure 5-1: Flat-roof installation

5.1 INSTALLATION SUMMARY

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

Table 5-1: Key to Figure 5-2

Item	Description
01	Collector
02	Mounting rail set
03	Flat roof angle frame
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 (for details of cruciform fixing pack, refer to Table 5-2)

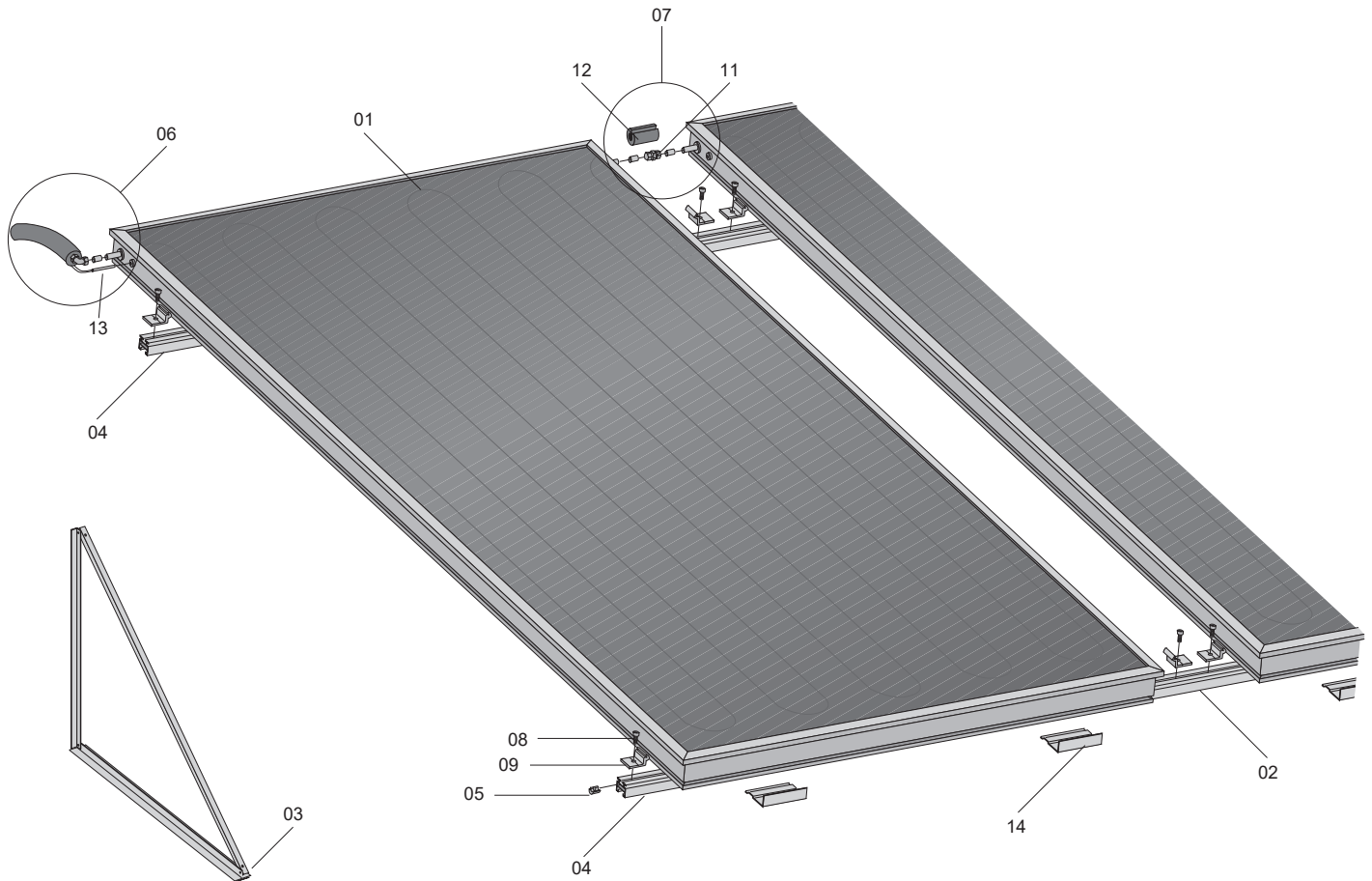


Figure 5-2: Installation Summary, Vertical Solar Collector Layout

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:
 $D1 = D2$ (see Figure 5-3).

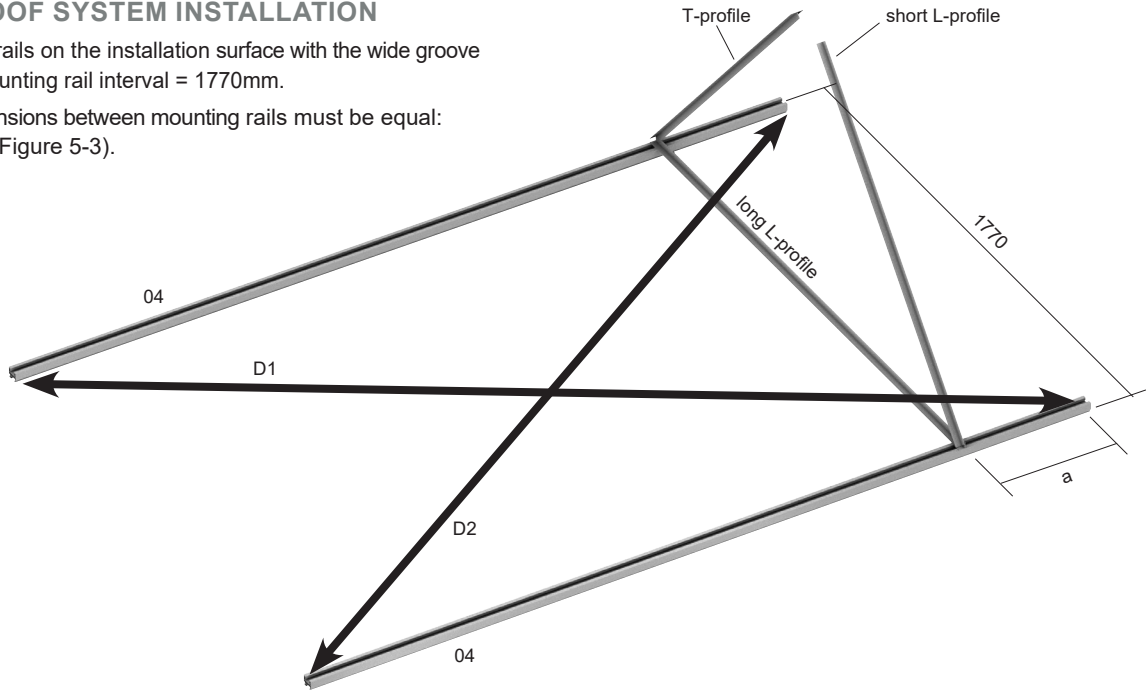


Figure 5-3: Installation of the First Flat Roof Mounting Bracket

2. Refer to Figure 5-3. 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 dimension "a", refer to Section 3.2.
3. Refer to Figure 5-4. Fix the flat roof mounting bracket to the mounting rail using the interlocking bolts, serrated washers and nuts provided.

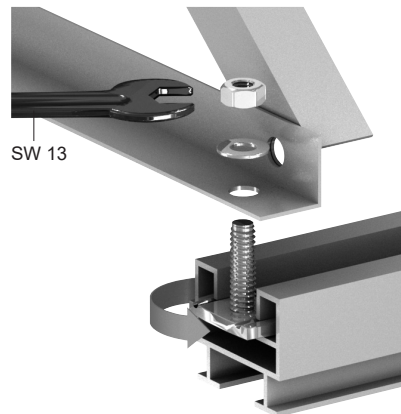


Figure 5-4: Fixing Using Interlocking Bolt

! NOTE !

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

4. Refer to Figure 5-5. 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 dimension "b", refer to Section 3.2.

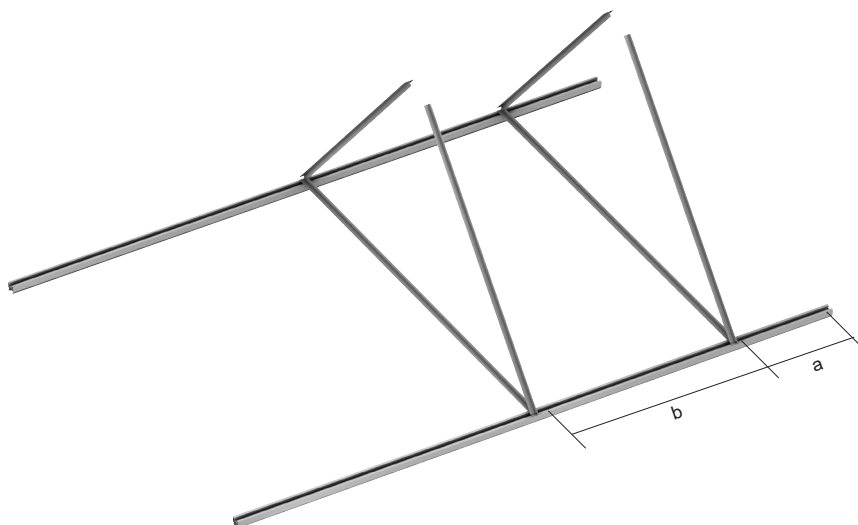


Figure 5-5: Installation of the Second Flat Roof Mounting Bracket

5. Refer to Figures 5-6, 5-7 and Table 5-2. Unpack the securing cruciform (15) and fixings pack. The cruciform is fixed to the short L-profile of the flat roof mounting bracket (see Figure 5-3).
First, position the pre-drilled hole in the upper part of the securing cruciform over the pre-drilled hole in the upper part of the short L-profile of the flat roof mounting bracket and secure with the bolts, grip washers and nuts supplied. See Figure 5-6.
6. Tighten the nuts on the interlocking bolts that secure the flat roof mounting bracket to the mounting rail. If necessary, modify the position of the second flat roof mounting bracket.
7. Refer to Figure 5-7. Position the pre-drilled hole in the lower part of the securing cruciform over the pre-drilled hole in the lower part of the short L-profile of the flat roof mounting bracket. Secure with the bolts, grip washers and nuts supplied.

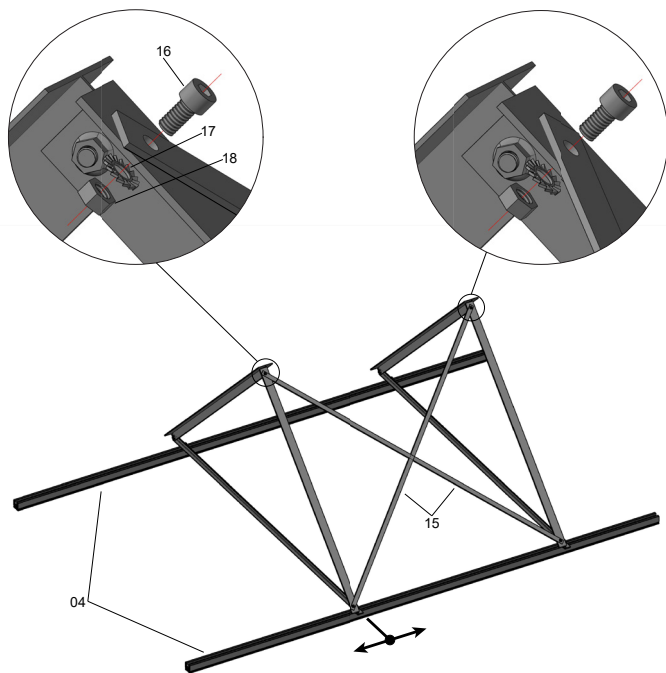


Figure 5-6: Installation of the Second Flat Roof Mounting Bracket and Securing Cruciform

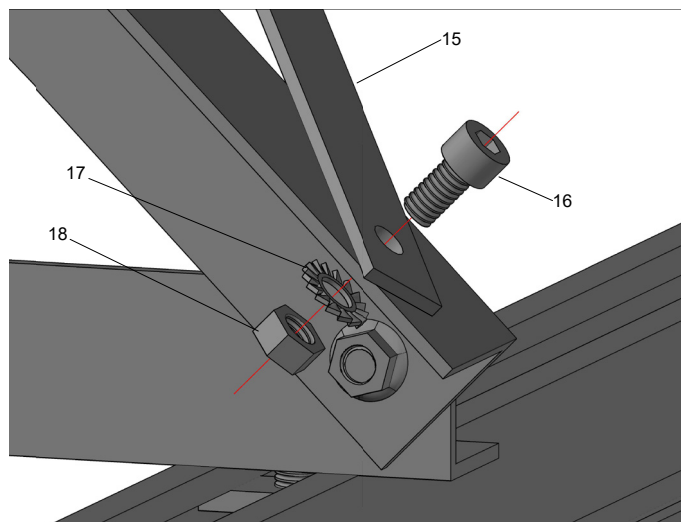


Figure 5-7: Fixing the Securing Cruciform and Mounting Rail

Table 5-2: Cruciform fixings pack contents

Item	Description
16	Allen bolt
17	Grip washer
18	Nut

8. 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 refer to Section 3.2.
9. 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.

Table 5-3: 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

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.

Refer to Section 7 for information regarding the installation of the solar collectors.

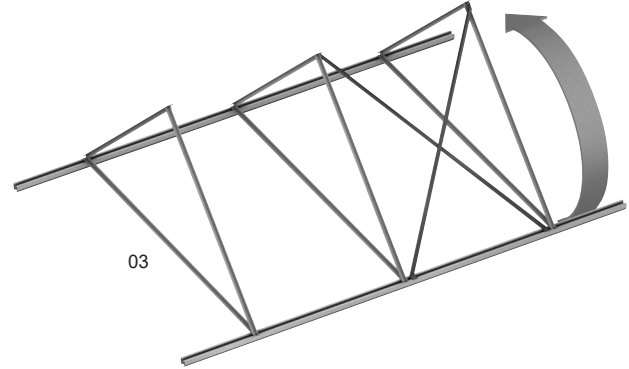


Figure 5-8: Fixing Additional Flat Roof Mounting Brackets

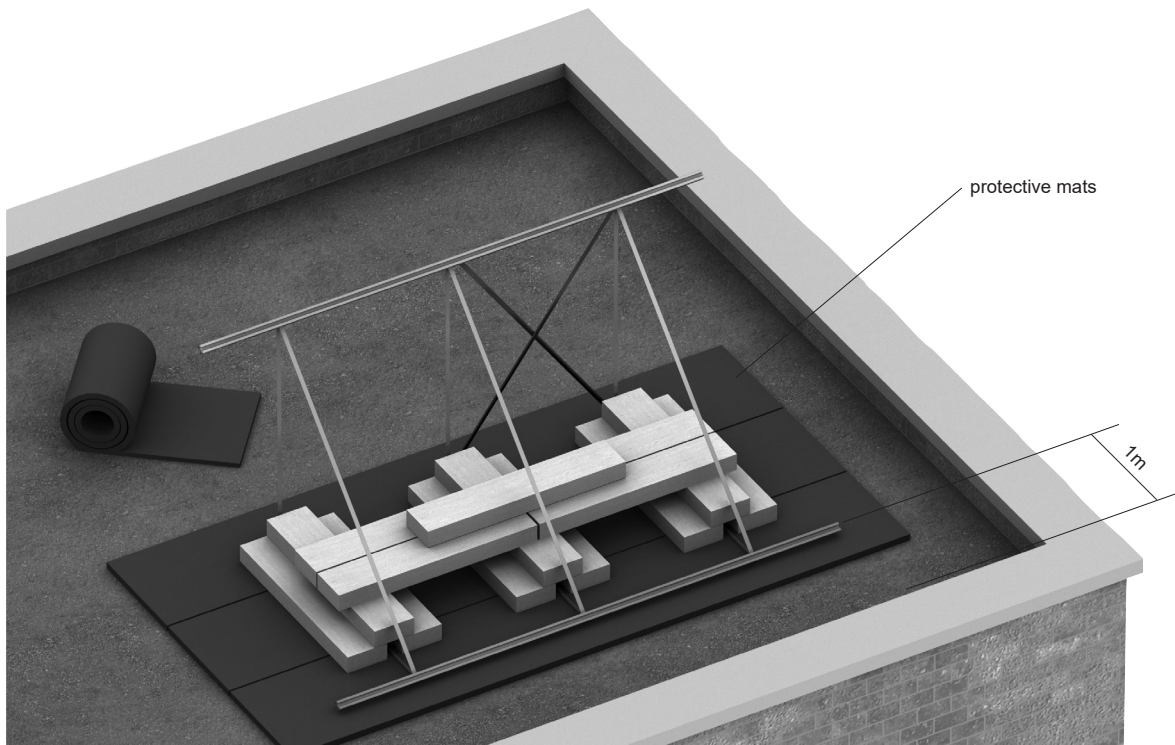


Figure 5-9: Robustness (Weighting)

6 IN-ROOF SYSTEM INSTALLATION

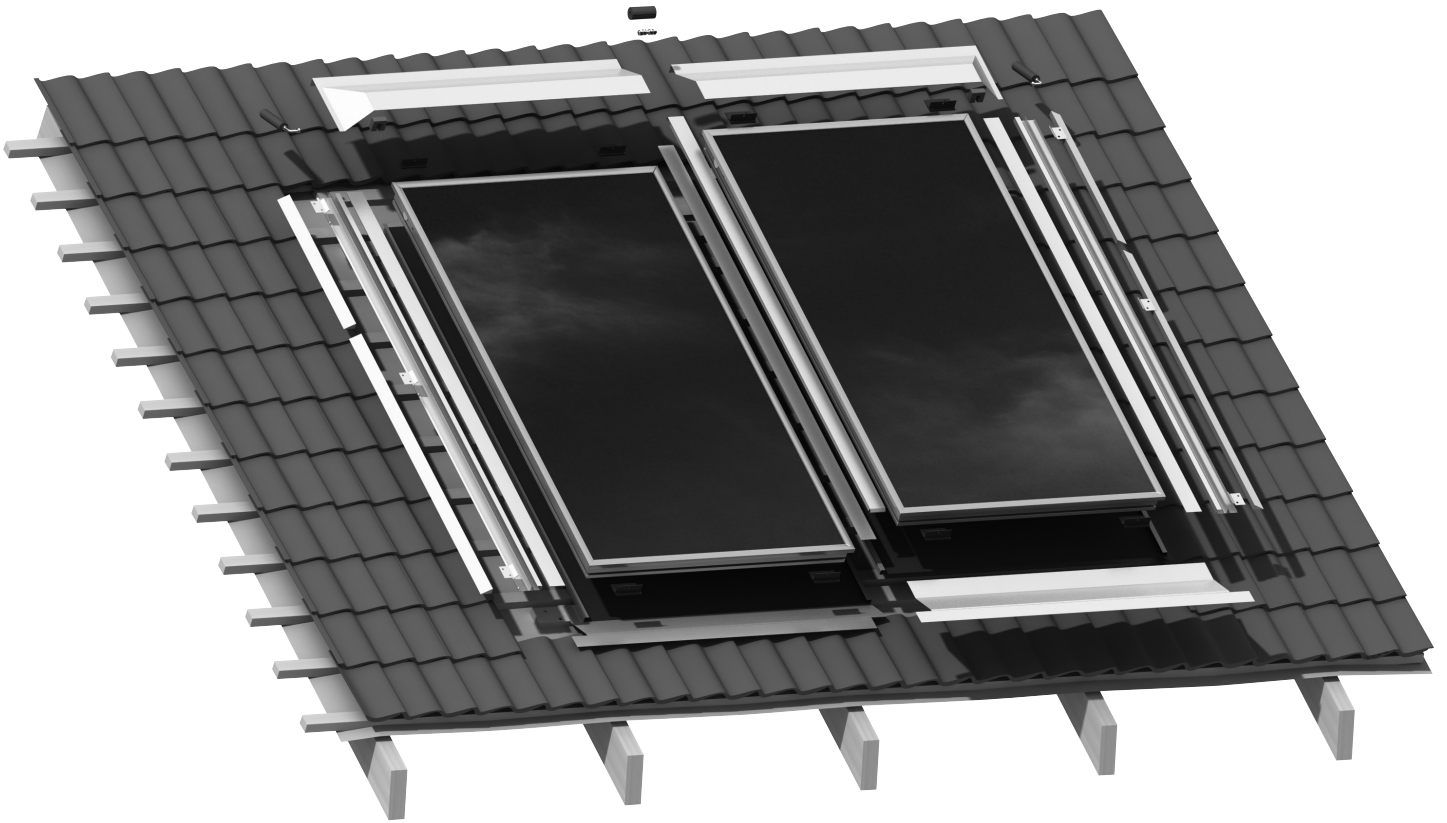


Figure 6-1: In-roof installation

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.

! NOTE !

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.

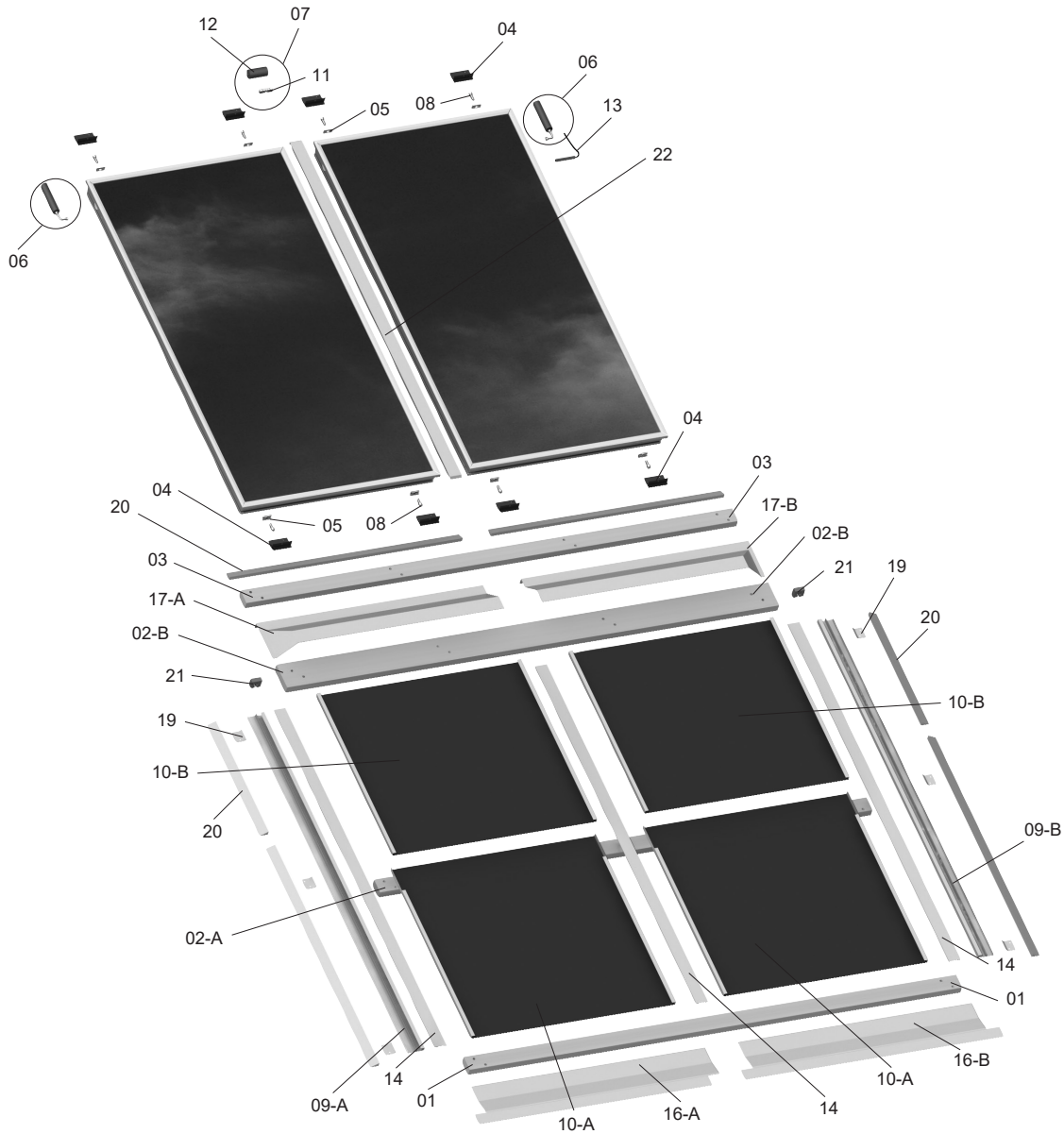


Figure 6-2: Installation Summary Vertical Collector Installation

Table 6-1: Key to Figure 6-2

Item	Description	Item	Description	Item	Description
01	Bottom batten (30 x 50 mm)*	09-B	Side gutter - right hand	16-B	Bottom apron - right hand flashing
02-A	Lower middle batten (30 x 50 mm)*	10-A	Base tray - lower section	17-A	Top cover - left hand flashing
02-B	Upper middle batten (30 x 50 mm)*	10-B	Base tray - upper section	17-B	Top cover - right hand flashing
03	Top batten (30 x 50 mm)*	11	Hydraulic connection	18	Fixing screw - not shown
04	Mounting bracket	12	Insulation	19	Clip (with nail - not shown)
05	Anchor block	13	Temperature sensor	20	Foam draught seal wedge
06	Collector connection kit	14	Cover strip	21	Foam draught seal block
07	Collector to collector connection kit (portrait collectors only)	15-A	Not in use	22	Closure strip
08	Cylinder anchor bolt	15-B	Not in use		
09-A	Side gutter - left hand	16-A	Bottom apron - left hand flashing		

* 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

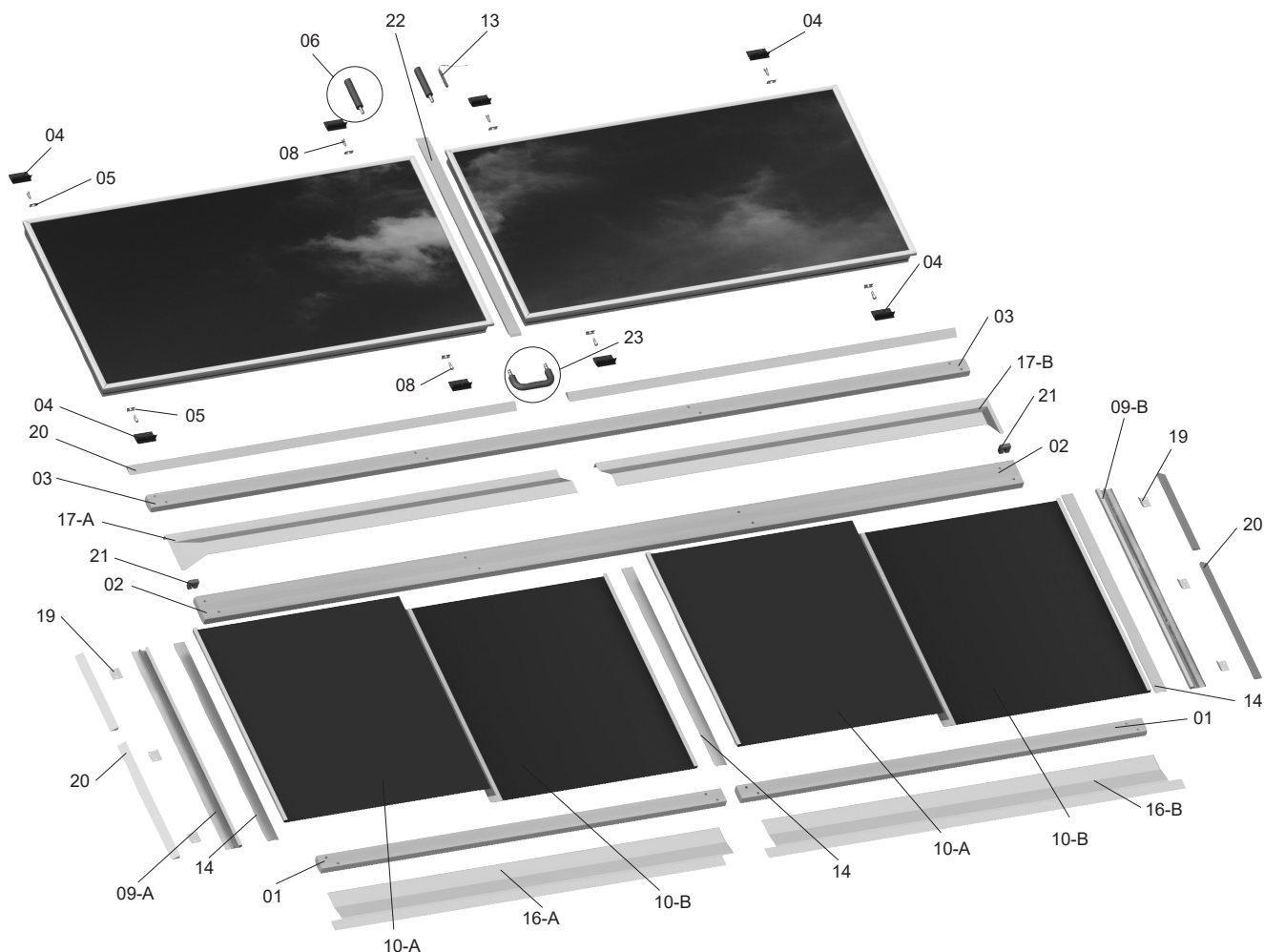


Figure 6-3: Installation Summary Landscape Collector Installation

! NOTE !

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.

Table 6-2: Key to Figure 6-3

Item	Description	Item	Description	Item	Description
01	Bottom batten (30 x 50 mm)*	10-A	Base tray - left half	16-B	Bottom apron - right hand flashing
02	Middle batten (30 x 90 mm)*	10-B	Base tray - right half	17-A	Top cover - left hand flashing
03	Top batten (30 x 50 mm)*	-		17-B	Top cover - right hand flashing
04	Mounting bracket	-		18	Fixing screw - not shown
05	Anchor block	13	Temperature sensor	19	Clip (with nail - not shown)
06	Collector connection kit	14	Cover strip	20	Foam draught seal wedge
08	Cylinder anchor bolt	15-A	Not in use	21	Foam draught seal block
09-A	Side gutter - left hand	15-B	Not in use	22	Closure strip
09-B	Side gutter - right hand	16-A	Bottom apron - left hand flashing	23	Collector to collector connection kit (landscape collectors only) - Refer to Section 8.2

* 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

! CAUTION !

To ensure that the in-roof installation meets the requirements of MCS012 (Pitched Roof Installation Kits), a fireproof membrane **MUST** be installed **UNDER** the in-roof cassette, as described in these instructions.

The fire performance rating applies only to the roofing kit when used with the family of modules specified in this manual, or other modules that have identical material specification and design of frame, coversheet, encapsulant, backing sheet and sealant.

A means for an installer to achieve a fire rating is to use a substrate with an independent fire rating (for example, a roofing membrane with AA rating) beneath a roofing kit/module combination that does not have a declared fire rating.

Refer to Appendix C of these Installation instructions for details of a suitable material.

The fireproof membrane will extend 100mm beyond the extremities of the In-roof cassette on all sides, i.e., the membrane will extend under the roof covering on all four sides of the In-roof cassette when the Installation is complete.

It is important to be able to verify that the system achieves a sufficient rating as a whole.

Failure to comply with this instruction will prevent the installation from being MCS compliant.

! CAUTION !

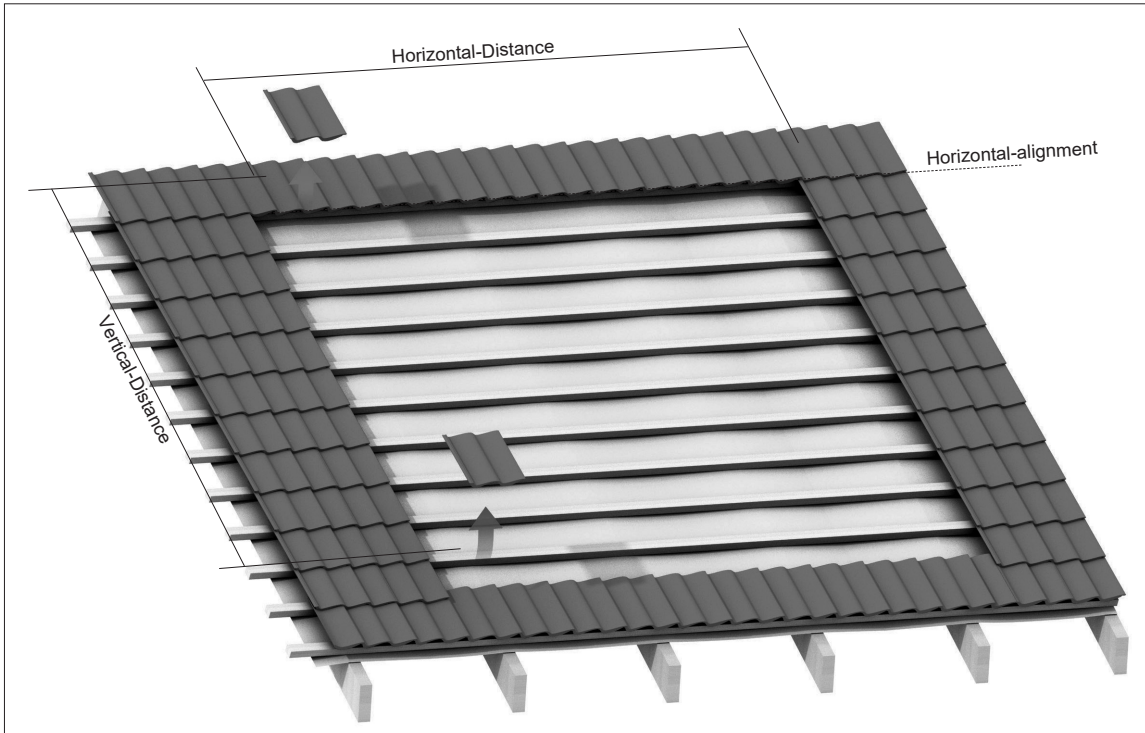
Do not attach safety harness to the integrated roof installation system!

1. Remove tiles in the installation area. Intervals must be above those given in Section 3.3. For ease of installation, an additional continuous row of roof tiles is required.
2. Refer to Figure 6-4. 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 Figures 6-6 and 6-7. 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.

3. Refer to Figures 6-6 and 6-7. 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 6-3 for the intervals between the battens. Secure the battens to the rafters with screws (supplied by installer).



! NOTE !

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.

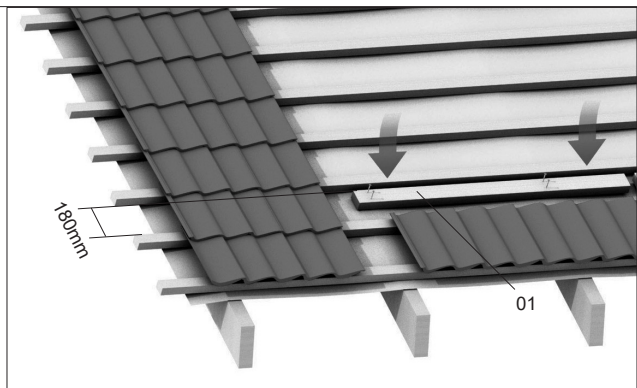


Figure 6-4: Remove Roof Covering

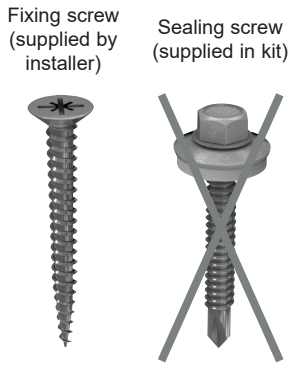


Figure 6-5: Screw Comparison

! NOTE !

The screws for fixing the horizontal fixing battens must be provided by the installer.
Do not use sealing screws (See Figure 6-5) supplied in the installation kit.

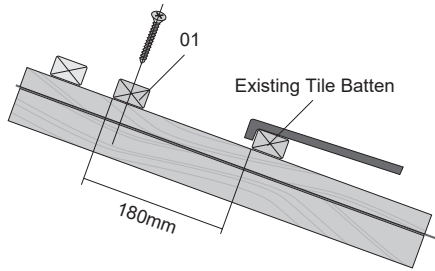


Figure 6-6: Bottom Fixing Batten

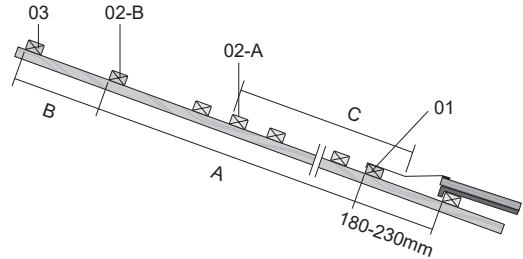


Figure 6-7: Top, Upper middle, Lower middle and Bottom Horizontal Fixing Battens

! CAUTION !

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

Table 6-3: Fixing Batten Spacing

Intervals between fixing battens (mm) for in-roof installation

Dimension	Portrait side by side	Landscape side by side
A	2,025	1,125
B	260	260
C	1,110	N/A

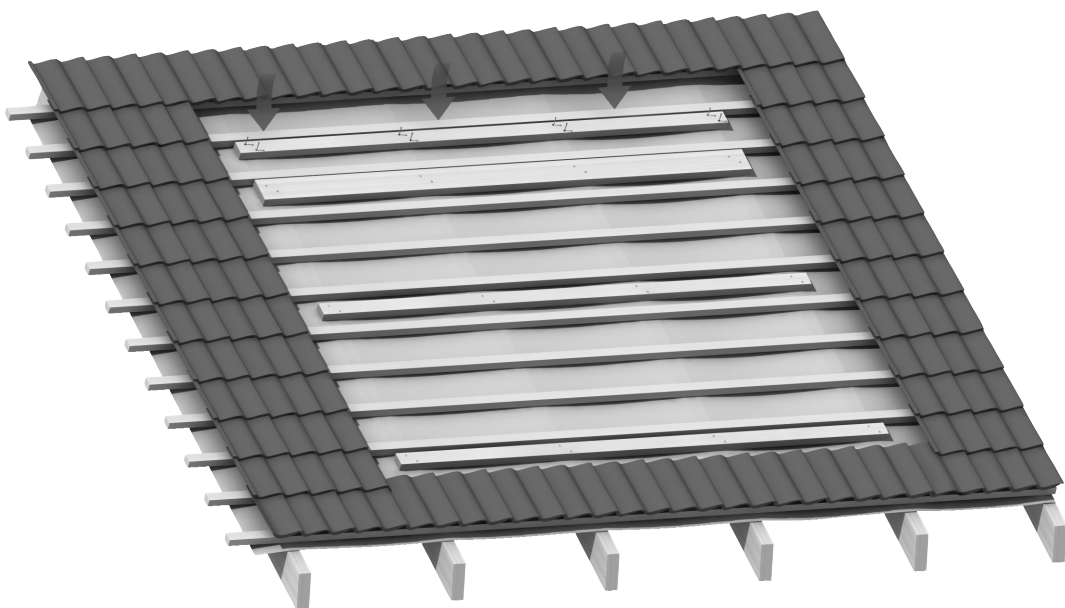


Figure 6-8: Install Fixing Battens

6.3 INSTALLATION OF IN-ROOF KIT

1. If the installation is to meet the standards for MCS approval, a suitable AA rated fire proof membrane (FPM) must be installed beneath the Grant UK in-roof cassette.
Refer to Appendix C at the back of these instructions for further details.
2. Fit the bottom flashings. See Figures 6-9 to 6-11.

! 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.

! NOTE !

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

Table 6-4: Overall width dimensions

Overall width dimensions (mm) for in-roof installation		
Quantity	Portrait side by side	Landscape side by side
1	1,460	2,355
2	2,645	4,440
3	3,835	6,525
4	5,025	8,615
5	6,215	10,700

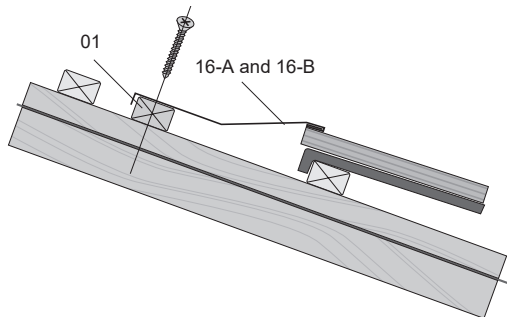


Figure 6-9: Installation of Bottom Flashing

3. Position the bottom flashings on the bottom batten. Where the bottom flashing is in two or more pieces, the left flashing should overlap the right where they join. DO NOT stick the sections together at this stage. Adjust width of the bottom flashing to suit - see Table 6-4. 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.

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

! NOTE !

For slates, use a of suitable mastic sealant (not supplied) to seal the bottom flashing (16-A and 16-B) to the roof. Apply a bead of sealant on the underside of the flashing, along the entire length, and press down to seal to the slates.

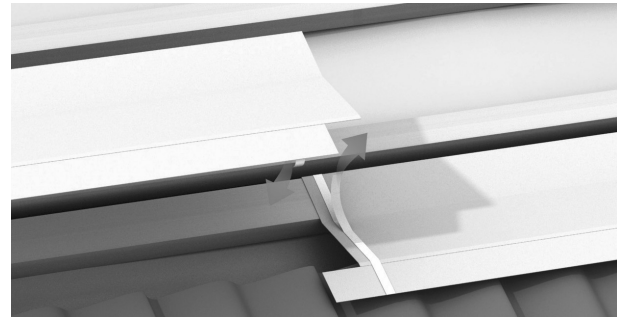


Figure 6-10: Installation of Additional Bottom Flashings

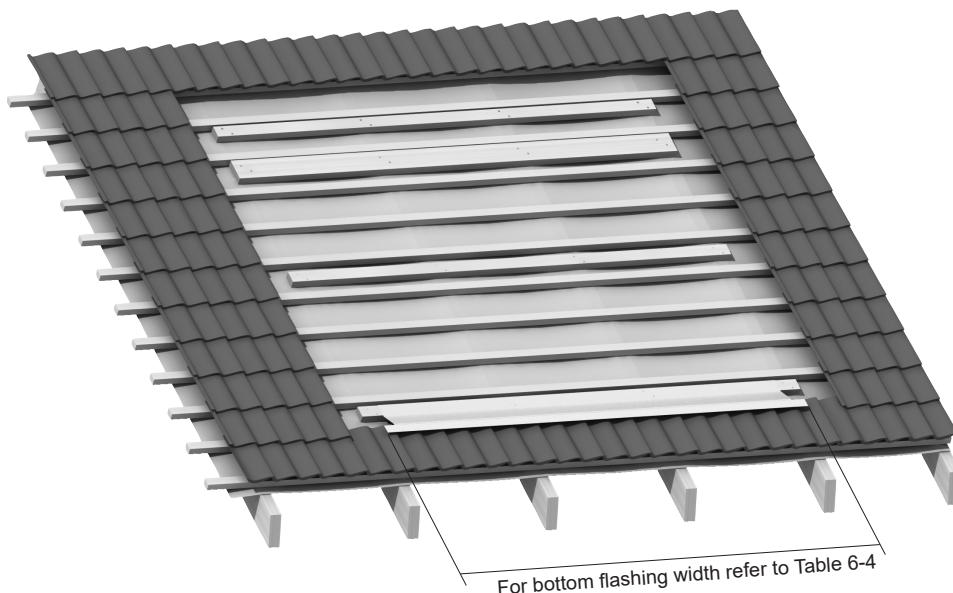


Figure 6-11: Bottom Flashing Installed

For 'Portrait' installations: (refer to Figure 6-2 and Table 6-1)

4. Fit first lower base tray (10-A). Position side of tray at distance 'C' (see Table 6-5) from end of bottom flashing, with lower edge along the fold line of the bottom flashing – see Figure 6-12c.

! 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 6-12a. 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 6-12b.

! NOTE !

If the in-roof kit is being fitted to a roof with slate tiles, a bead of mastic (not supplied) should be applied to the underside of the base tray before fixing in position.

Table 6-5: Position of base tray

Dimension C	
Portrait	145 mm
Landscape	165 mm

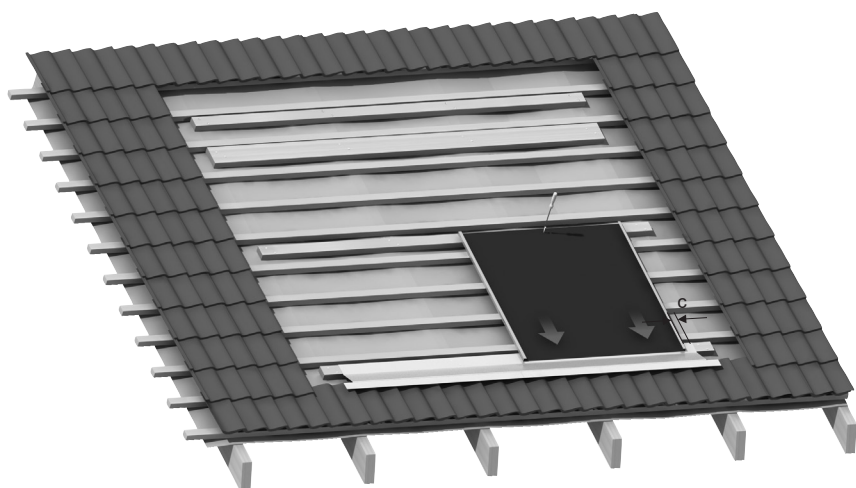


Figure 6-12a: Installation of Lower Base Tray ('portrait' installations)

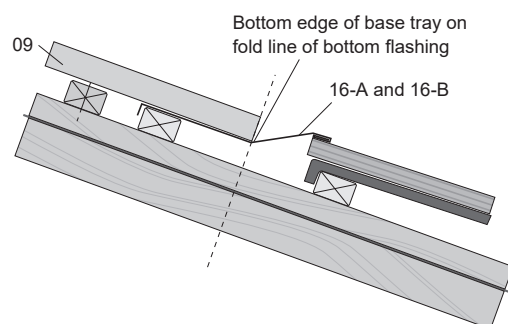


Figure 6-12c: Section Through Bottom Flashing

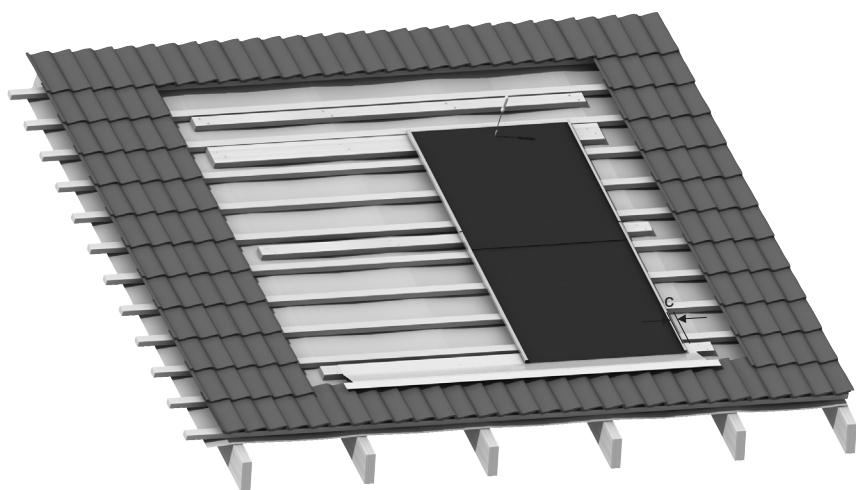


Figure 6-12b: Installation of Upper Base Tray ('portrait' installations)

5. 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 6-13c. Fix to lower middle batten as before using a single screw – see Figure 6-13a.

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 6-13b.

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

! NOTE !

If the in-roof kit is being fitted to a roof with slate tiles, a bead of suitable mastic sealant (not supplied) should be applied to the underside of the base tray before fixing in position.

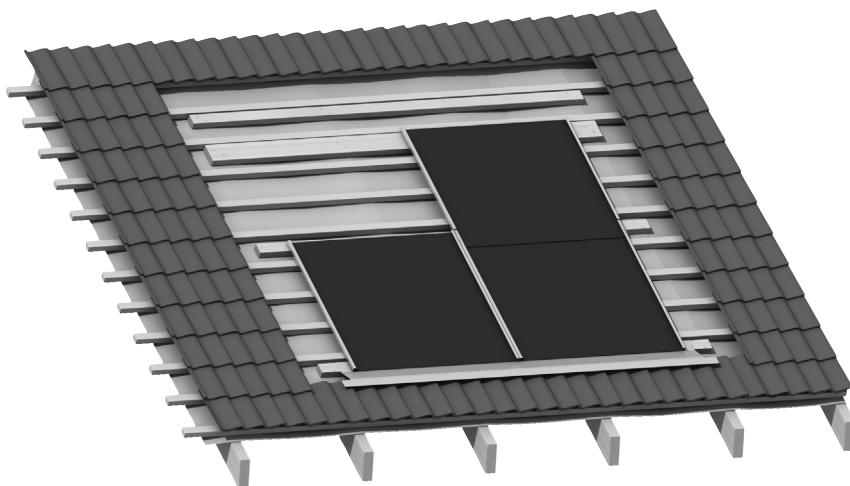


Figure 6-13a: Installation of First Base Tray ('portrait' installations)

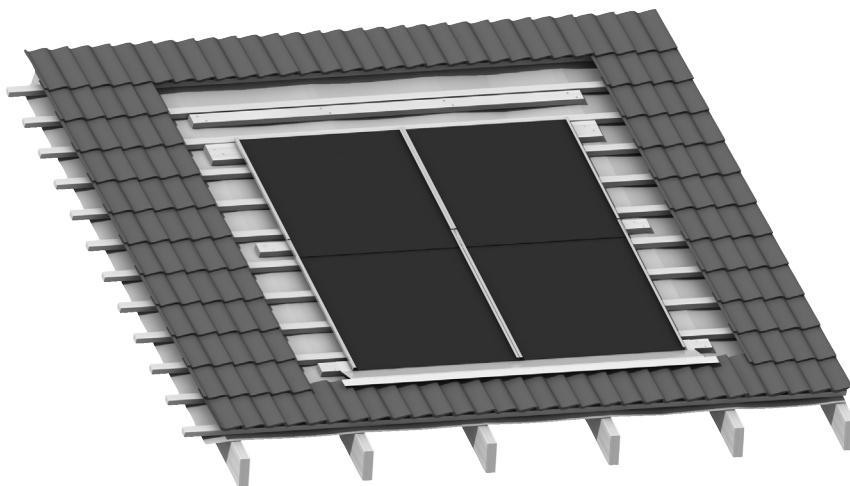


Figure 6-13b: Installation of Second Base Tray ('portrait' installations)

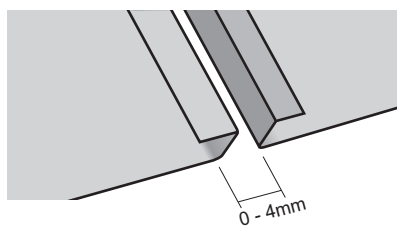


Figure 6-13c: Maximum Gap Between Base Trays

For 'Landscape' installations: (refer to Figure 6-3 and Table 6-2)

6. 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' (see Table 6-5) from end of bottom flashing with lower edge along the fold line of the bottom flashing – see Figure 6-12c.

! 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 middle batten (02) using one of the self-drilling sealing screws provided in the installation kit at the centre of the upper edge – see Figure 6-14a.

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 6-14b.

7. 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 6-13c. Fix to middle batten using one of the self-drilling sealing screws provided in the installation kit at the centre of the upper edge.

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.

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

! NOTE !

If the in-roof kit is being fitted to a roof with slate tiles, a bead of mastic (not supplied) should be applied to the underside of the base tray before fixing in position.

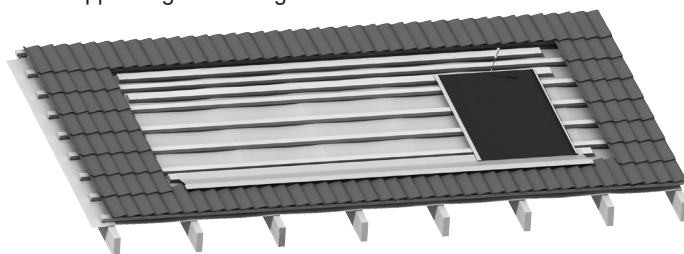


Figure 6-14a: Installation of First Tray ('landscape' installations)

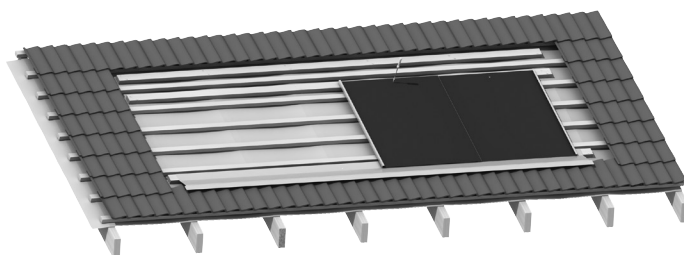


Figure 6-14b: Installation of Second Tray ('landscape' installations)

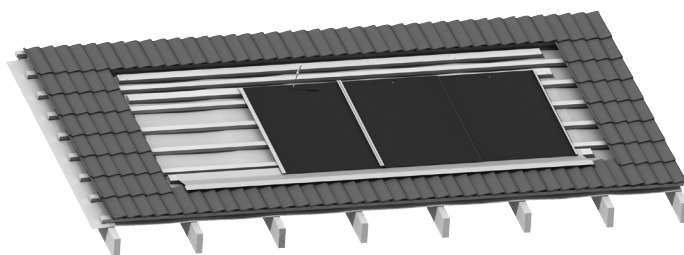


Figure 6-14c: Installation of Third Tray ('landscape' installations)

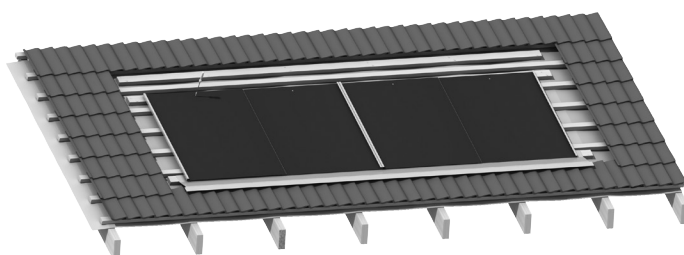


Figure 6-14d: Installation of Fourth Tray ('landscape' installations)

Side gutter

8. Fit side gutter (09). Position side gutters against side of base tray(s) 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.
9. Repeat the above procedure for the right side gutter.
10. 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.

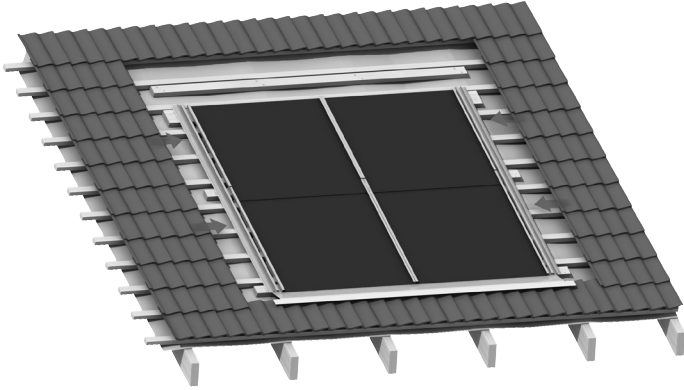


Figure 6-15: Installation of Side Gutter

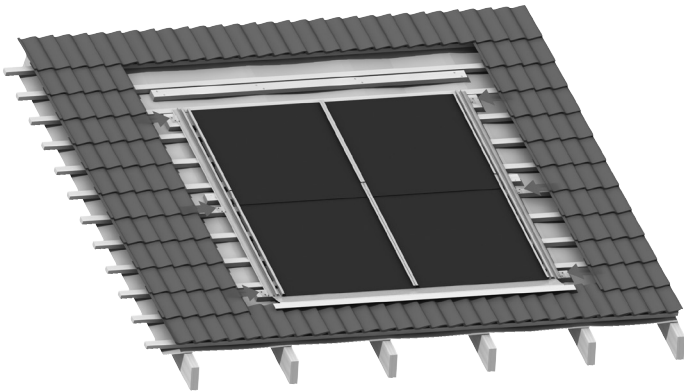


Figure 6-16: Location of Clips on Side Gutters

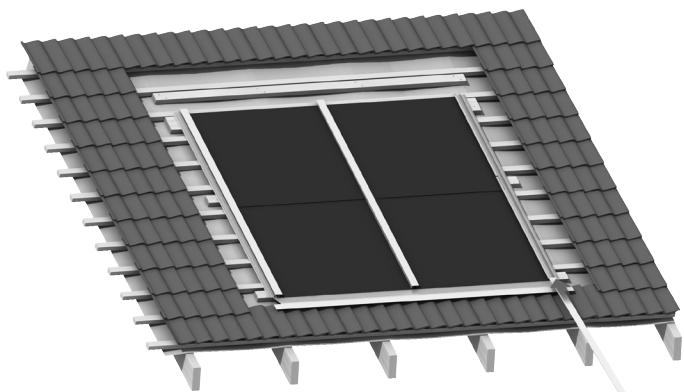


Figure 6-17: Fitting of Cover Strips



Figure 6-18: Securing Side Gutter Clips

Cover strips

11. 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 6-19. Slide cover strip up the full length of the joint. Finally fold over at both ends of cover strip to secure - see Figure 6-20. Repeat to fit cover strips on the other side gutter and on all joints between the base trays.

! NOTE !

Ensure that the cover strips are fitted such that the upper section overlaps the lower section.

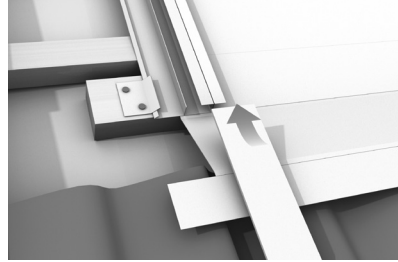


Figure 6-19: Installation of Cover Sheets



Figure 6-20: 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 Figures 6-21 to 6-23. Carefully mark their position on the base tray with a pencil.

! NOTE !

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 6-22.

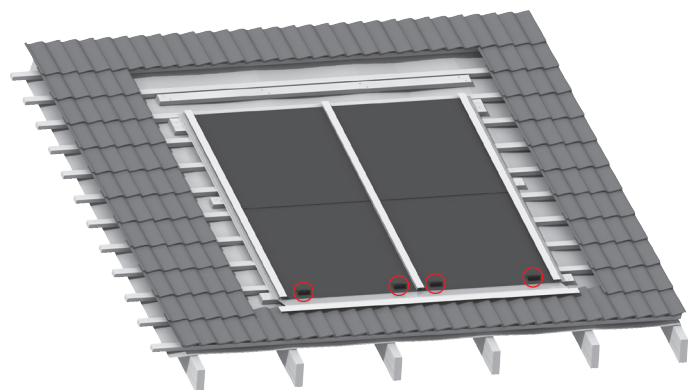


Figure 6-21: Location of bottom Mounting Brackets

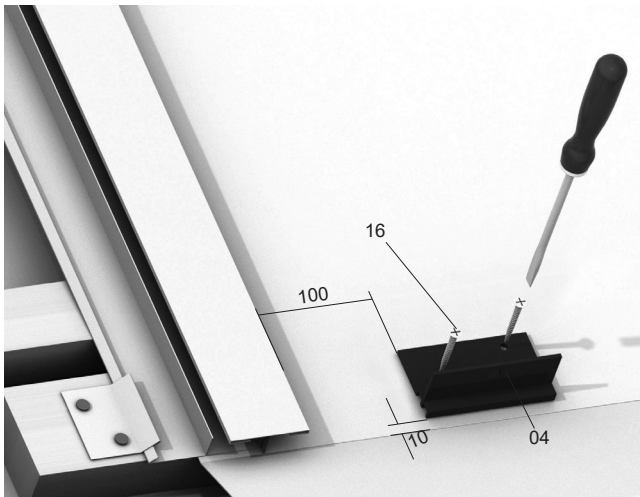


Figure 6-22: Fixing of bottom Mounting Brackets

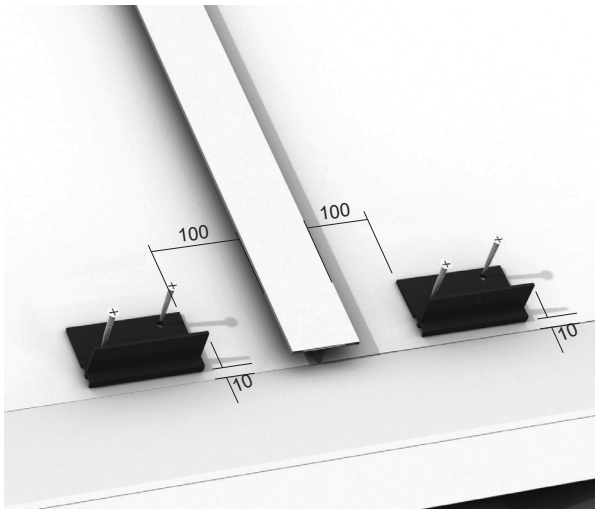


Figure 6-23: Bottom Mounting Bracket Dimensions

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 6-24. 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 Figures 6-25 and 6-26.
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.



Figure 6-24: Installation of the Collectors on to Bracket

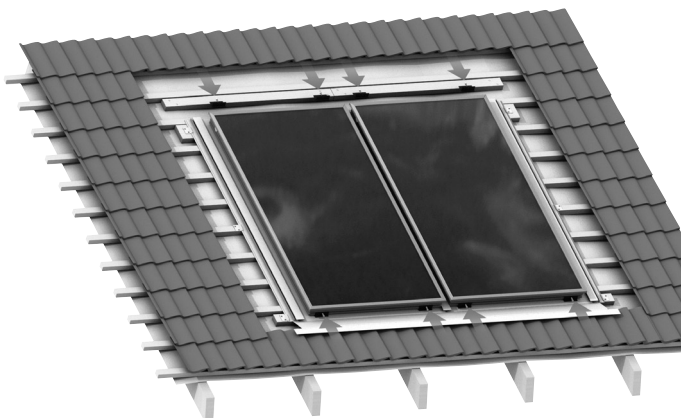


Figure 6-25: Installation of the Top Brackets



Figure 6-26: Fixing of the Top Brackets

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 in contact with the collector sides over its entire length. Slide the closure strip up or down, as necessary, to align 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.
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 6-28.
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.

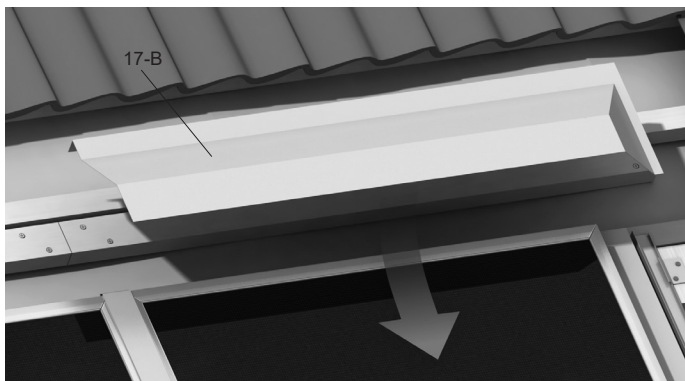


Figure 6-27: Fitting right Top Cover Flashing (17-B) to Collector



Figure 6-29: Fitting Foam Block (21)



Figure 6-28: Fixing left hand Top Cover Flashing (17-A)

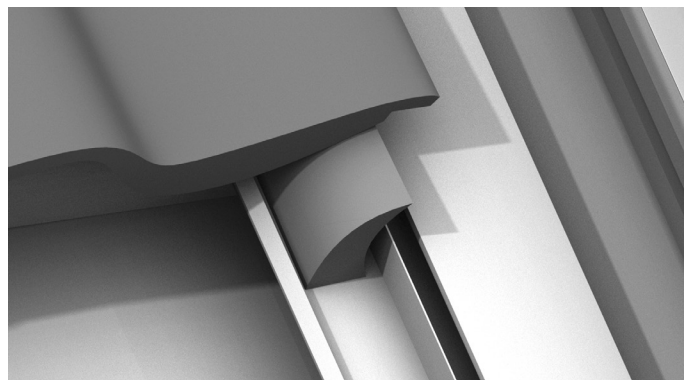


Figure 6-30: Position of Foam Sealing Wedges

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

! NOTE !

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

7 INSTALLATION OF SOLAR COLLECTORS

7.1 INSTALLATION SEQUENCE OF SOLAR COLLECTORS

Refer to Figure 4-2 and Table 4-1 for component number descriptions.

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.

! NOTE !

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.

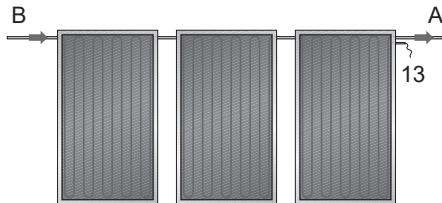


Figure 7-1: Connections for Portrait Format Collectors Mounted Side by Side

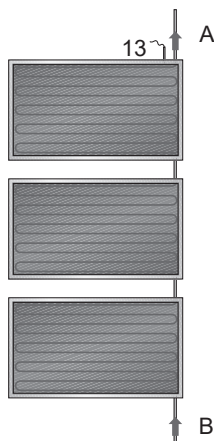


Figure 7-2: Connections for Landscape Format Collectors Mounted one Above the Other

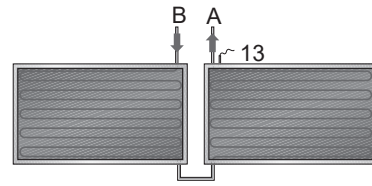


Figure 7-3: Connections for Two Landscape Format Collectors Mounted Side by Side

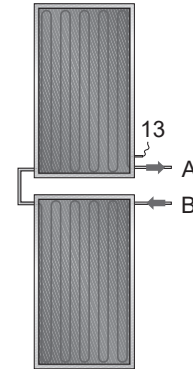


Figure 7-4: Connections for Two Portrait Format Collectors Mounted one Above the Other

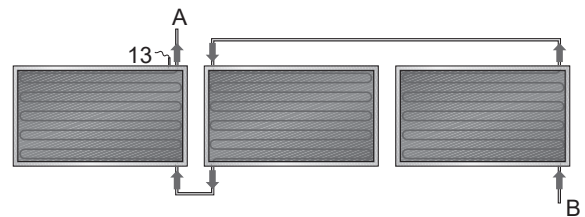


Figure 7-5: Connections for Three Landscape Format Collectors Mounted Side by Side

7.2 INSTALLATION OF SOLAR COLLECTORS ON-ROOF AND FLAT ROOF

Refer to Figure 4-2 and Table 4-1 for component number descriptions.

! CAUTION !

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).

1. 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
2. Place the first solar collector on the mounting rail/mounting hook and align.
Distance to left-hand mounting rail edge = 39mm
3. Remove carry handles from the first solar collector and attach them to the next solar collector.
4. 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.

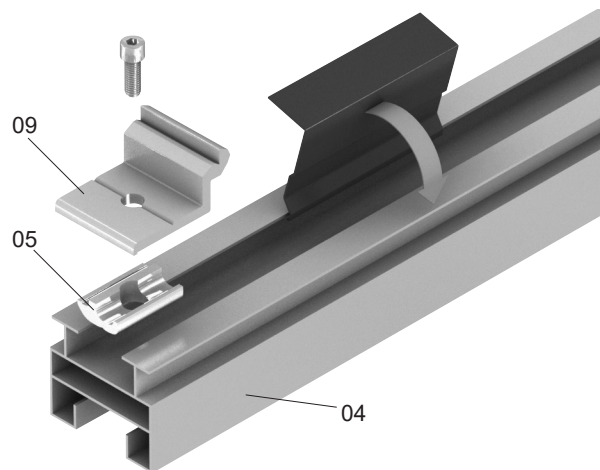


Figure 7-8: Installing the Anchor Blocks for the Fixing Brackets

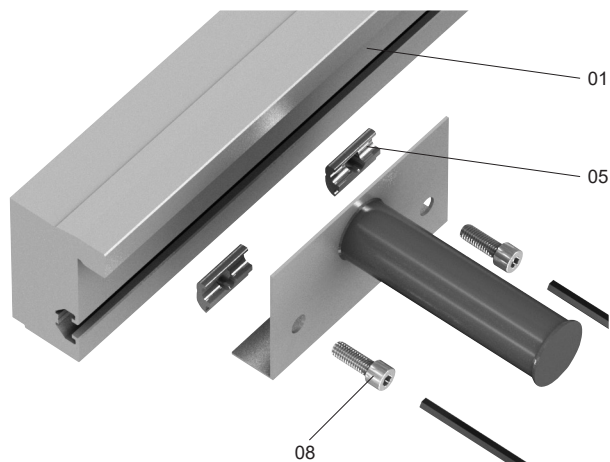


Figure 7-6: Fixing the Carry Handles

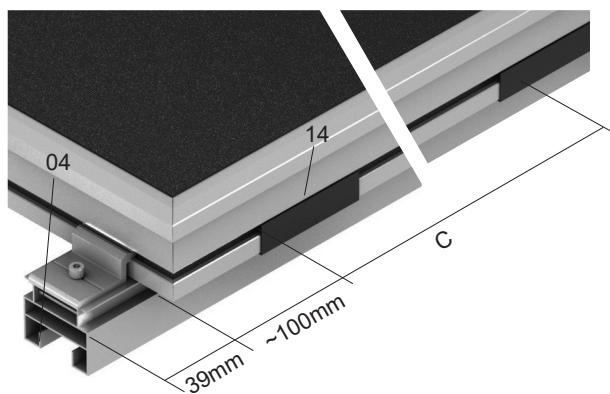


Figure 7-7: Positioning the Mounting Hooks

5. 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.
6. 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
7. Place the compression fitting (11) on the connector of the first solar collector.
8. Hook two further mounting hooks into the lower mounting rail, see Figure 7-7, Positioning the Mounting Hooks.
9. Place another solar collector on the mounting rail/mounting hooks and remove the carry handles.
10. 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.
11. Install fixing brackets into the solar collector profile and push them down onto the mounting rails.
12. Push the second solar collector up to the first solar collector until the ends of the fixing brackets touch using cylinder bolts M8x14.

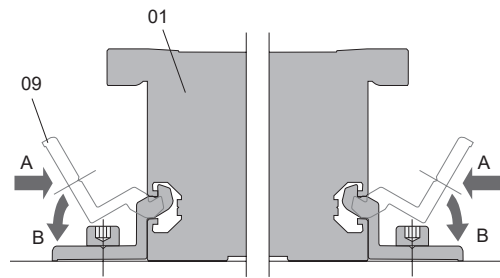


Figure 7-9: Hook Fixing Brackets in the Solar Collector Profile

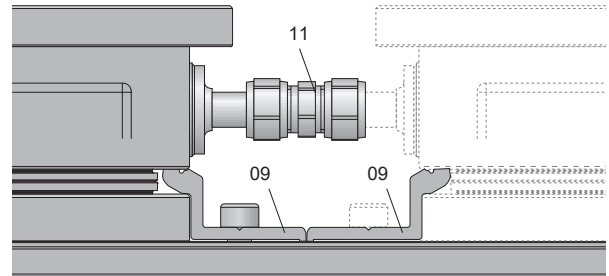


Figure 7-10: Align Anchor Block for Additional Fixing Brackets

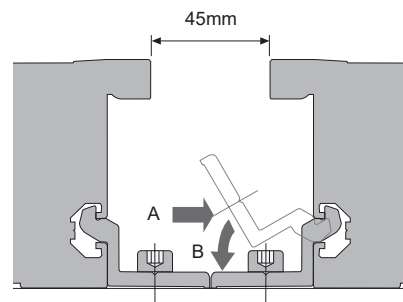


Figure 7-11: Hook Fixing Brackets in the Solar Collector Profile

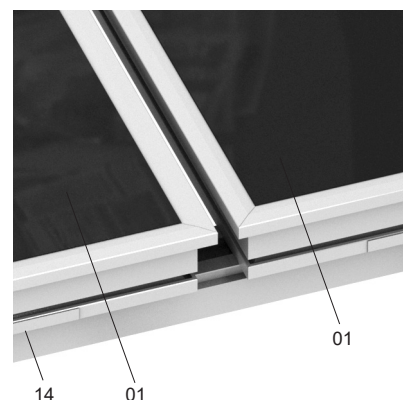


Figure 7-12: Align Second Solar Collector

! NOTE !

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

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

! NOTE !

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

! NOTE !

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

Refer to Figure 4-2 and Table 4-1 for component number descriptions.

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 (13) in the sensor pocket next to the Outlet (flow) connection of the collector array, as shown in Figure 8-4.

5. Push back the thermal insulation on the solar collector connection kits, place the compression connections onto the connectors and secure.
6. Refer to Figure 8-4. Take the temperature sensor seal 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.

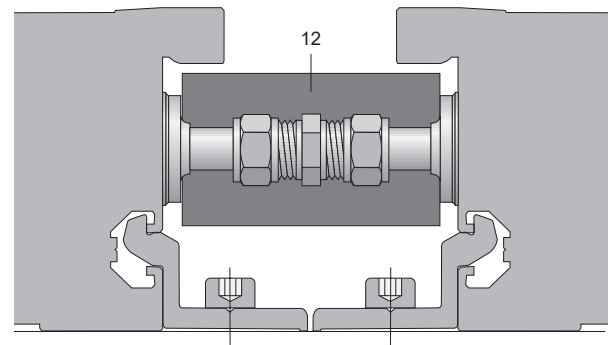


Figure 8-2: Fit Thermal Installation

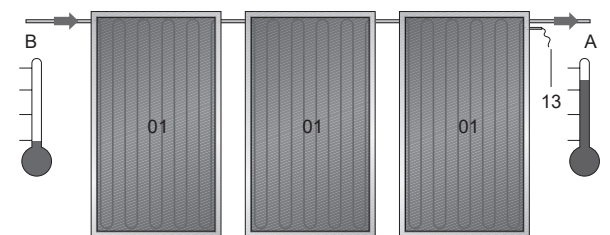


Figure 8-3: Solar Collector Field Attachment

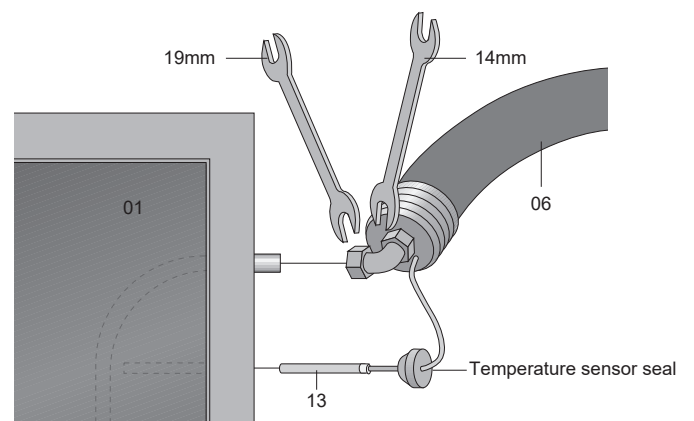


Figure 8-4: Connection of Temperature Sensor

! NOTE !

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.

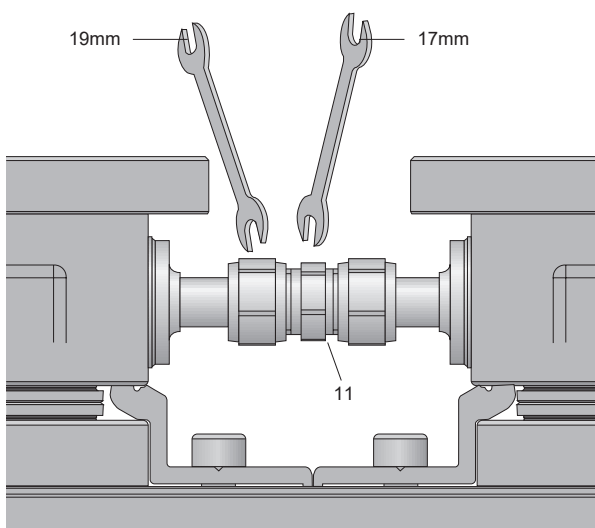


Figure 8-1: Hydraulic Connection

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 insulation (not supplied) 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 connection, 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.

! NOTE !

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.

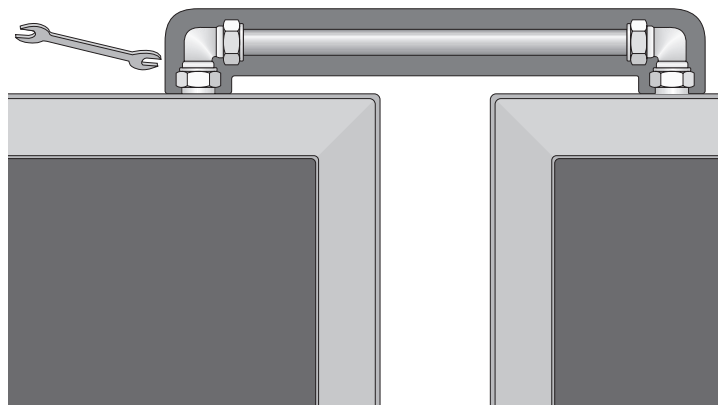


Figure 8-5: Hydraulic Connection, Landscape Installation

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.

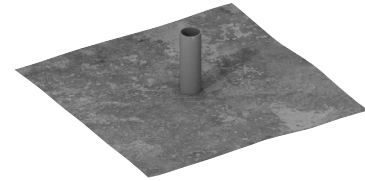


Figure 9-3: Lead Flashing

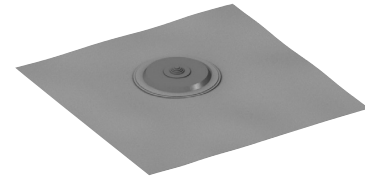


Figure 9-4: SolarDek Flashing

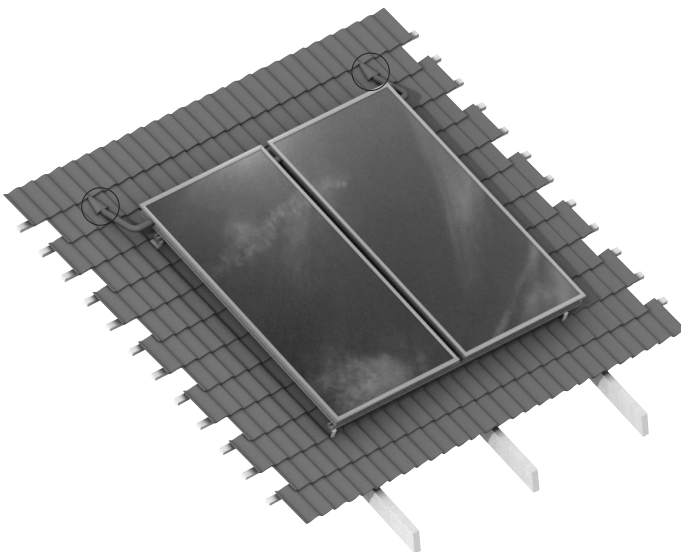


Figure 9-1: Solar Collector Field Attachment for On-Roof Systems

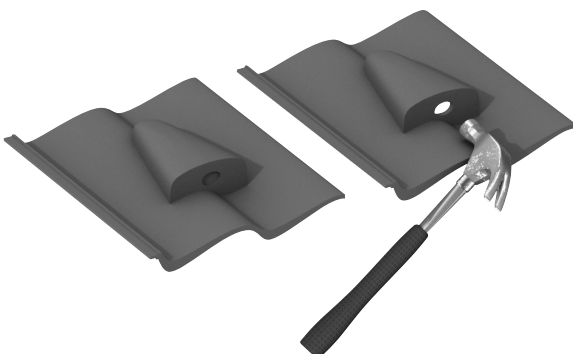


Figure 9-2: Ventilation Tile

2. Push the thermal insulation for the solar collector connection kits (see item 06 in Figure 4-2 and Table 4-1) 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.

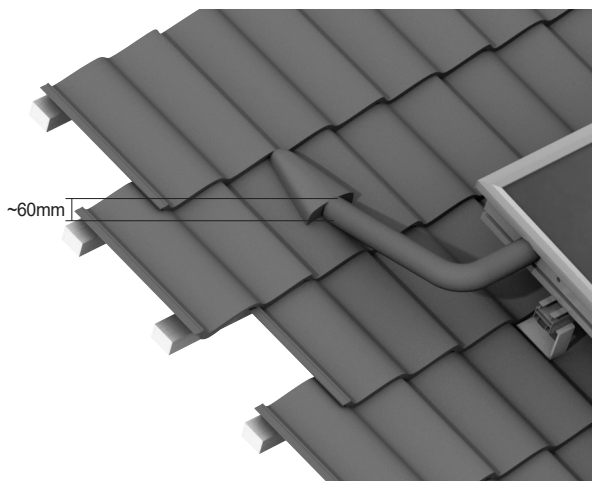


Figure 9-5: Detail View of Solar Collector Field Connection - On-Roof Systems

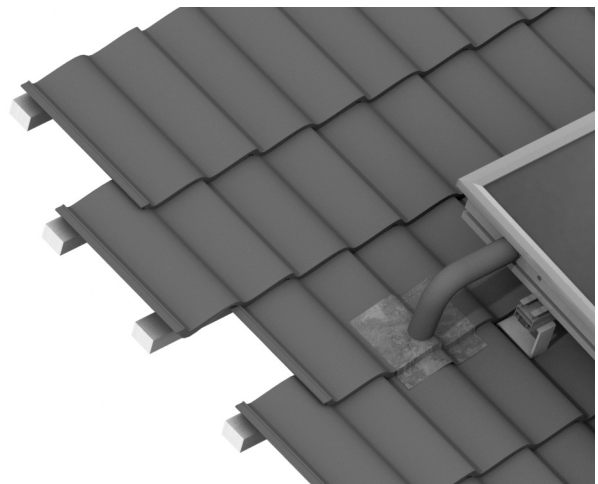


Figure 9-6: Detail View of Solar Collector Field Connection - On-Roof Systems

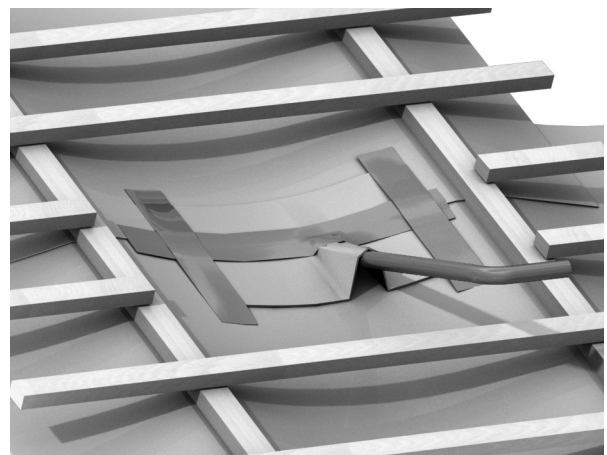


Figure 9-7: An Example of Passing Through the Waterproof Membrane

10 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.	2.32m 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.	209 °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.	
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
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.	m2
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/ 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

! WARNING !

Isolate the electrical power supply to all system controls.

Check the following:

1. Collectors
 - **Collector fixings** - ensure that they are secure – re-tighten 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 Section 11.2 - Solar Fluid.
 - c) Check the air charge in the vessel - refer to Section 14 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 installation instructions supplied with the Grant Solar Pump Station (Grant UK DOC 0096) for details.

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.

! WARNING !

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 installation instructions supplied with the Grant Solar Pump Station (Grant UK DOC 0096) for details. Top-up or re-fill as required.
2. Controls - After reconnecting the power supply to controls, check the following:
 - a) **Settings on Solar Controller are correct** – Refer to the installation instructions supplied with the Solar Controller (either Grant UK DOC 0097 or 0107 - as appropriate) for details.
 - b) **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 installation instructions supplied with the Grant Solar Pump Station (Grant UK DOC 0096) for details.

! NOTE !

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°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 Appendix A 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 GUARANTEE

You are now the proud owner of a solar thermal system from Grant Engineering (UK) Limited that has been designed to give years of reliable, trouble free, operation.

Grant Engineering (UK) Limited guarantees the manufacture of the solar thermal system including all electrical and mechanical components for a period of **twelve months from the date of installation⁴**, provided that the system is installed in full accordance with the installation and servicing instructions provided.

This will be extended to a total period of **five years** if the solar thermal system is registered with Grant Engineering UK Limited **within thirty days of installation⁴** and serviced biennially³. See main Terms and Conditions below.

In addition, the collector (panel) has a performance guarantee for a period of **five years** (parts only) from the date of installation⁴.

Registering the product with Grant Engineering (UK) Limited

Please register your solar thermal system with Grant Engineering UK Limited **within thirty days of installation**.

To do so visit www.grantuk.com and follow the links to the 'Homeowners Zone', where you can register your solar thermal system for a further **four years** guarantee (giving **five years** from the date of installation). This does not affect your statutory rights¹.

If a fault or defect occurs within the manufacturer's guarantee period

If your solar thermal system should fail within the guarantee period, you must contact Grant Engineering (UK) Limited, who will arrange for the repair under the terms of the guarantee, providing that the solar thermal system has been correctly installed, commissioned and serviced (if the system has been installed for more than twenty four months) by a competent person and the fault is not due to tampering, misuse, or the failure of any system components not supplied by Grant Engineering (UK) Limited, e.g. pipework, hot water cylinder, etc., or the incorrect setting of the system controls.

This five year guarantee only applies if the solar thermal system is registered with Grant Engineering (UK) Limited within thirty days of installation and is serviced every twenty four months³.

In the first instance

Contact your installer or commissioning engineer to ensure that the fault does not lie with the system components or any incorrect setting of the system controls that falls outside of the manufacturer's guarantee otherwise a service charge could result. Grant Engineering (UK) Limited will not be liable for any charges arising from this process.

If a fault covered by the manufacturer's guarantee is found

Ask your installer to contact Grant Engineering (UK) Limited Service Department on +44 (0)1380 736920 who will arrange for a competent service engineer to rectify the fault.

Remember – before you contact Grant Engineering (UK) Limited:

- Ensure the solar thermal system has been installed, commissioned and serviced by a competent person in accordance with the installation and servicing instructions.
- Ensure the problem is not caused by the connecting system or its control settings.

Free of charge repairs

During the **five year** guarantee period no charge for parts or labour will be made, provided that the solar thermal system has been installed and commissioned correctly in accordance with the manufacturer's installation and servicing instructions, it was registered with Grant Engineering (UK) Limited within thirty days of installation⁴ and, for solar thermal systems over twelve months old, details of biennial service is available³.

The following documents must be made available to Grant Engineering (UK) Limited on request:

- Proof of purchase
- Installation Form
- Commissioning Report Form
- Service documents

Chargeable repairs

A charge may be made (if necessary following testing of parts) if the breakdown is due to any fault(s) caused by the plumbing or heating system, e.g. contamination of parts due to system contamination, etc. See 'Extent of manufacturer's guarantee' below.

Extent of the manufacturer's guarantee

The manufacturer's guarantee does not cover the following:

- If the solar thermal system has been installed for over five years
- If the solar thermal system has not been installed, commissioned, or serviced by a competent person in accordance with the installation and servicing instructions.
- Fault(s) due to accidental damage, tampering, unauthorised adjustment, neglect, misuse or operating the solar thermal system contrary to the manufacturer's installation and servicing instructions.
- Damage due to external causes such as bad weather conditions (flood, storms, lightning, frost, snow, or ice), fire, explosion, accident or theft.
- Fault(s) caused by external electrics and external components not supplied by Grant Engineering (UK) Limited.
- Damage due to mechanical stress.
- Minor colour deviations and surface flaws not affecting the functioning or performance of the collector (panel).
- Condensation forming on the inside of the collector (panel)⁵.
- Solar thermal system servicing.
- Checking and replenishing system pressure/solar fluid.
- Electrical cables, external controls, etc., not supplied by Grant Engineering (UK) Limited.
- Heating system components, such as pipework, fittings, pumps and valves not supplied by Grant Engineering (UK) Limited.
- Instances where the solar thermal system has been un-installed and re-installed in another location.
- Mixed systems, i.e. those that include components or collectors (panels) that have been supplied by another manufacturer.
- Use of spare parts not authorised by Grant Engineering (UK) Limited.
- Consumable items including but not limited to solar fluid or antifreeze.

Terms of the manufacturer's guarantee

- The Company shall mean Grant Engineering (UK) Limited.
- The 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.
- The solar thermal system is guaranteed for **five years** from the date of installation⁴, providing that every twenty four months the biennial service has been completed³ and the solar thermal system registered with the Company within thirty days of the installation date⁴. Any work undertaken must be authorised by the Company and carried out by a competent service engineer.
- The collector (panel) is also covered by a **five year** (parts only) performance guarantee from the date of installation⁴. This is subject to the following:
 - o The solar thermal system is operated correctly, in accordance with the installation and servicing instructions
 - o Proof of biennial servicing (including the checking of any expansion vessels and pressure relief valves) must be provided if and when requested by the Company.
- This guarantee does not cover breakdowns caused by incorrect installation, neglect, misuse, accident or failure to operate the solar thermal system in accordance with the manufacturer's installation and servicing instructions.
- The solar thermal system is registered with the Company within thirty days of installation. Failure to do so does not affect your statutory rights¹.
- The balance of the guarantee is transferable providing the installation is serviced prior to the dwelling's new owners taking up residence. Grant Engineering (UK) Limited must be informed of the new owner's details.
- The Company will endeavour to provide prompt service in the unlikely event of a problem occurring, but cannot be held responsible for any consequences of delay however caused.
- This guarantee applies to Grant Engineering (UK) Limited solar thermal systems purchased and installed on the UK mainland, Isle of Wight, Channel Islands and Scottish Isles only². Provision of in-guarantee cover elsewhere in the UK is subject to agreement with the Company.
- All claims under this guarantee must be made to the Company prior to any work being undertaken. Invoices for call out/repair work by any third party will not be accepted unless previously authorised by the Company.
- Proof of purchase and date of installation, commissioning and service documents must be provided on request.
- If a replacement solar thermal system/collector (panel) is supplied under the guarantee (due to a manufacturing fault) the product guarantee continues from the date of installation of the solar thermal system, and not from the installation date of the replacement⁴.
- The replacement of a solar thermal system under this guarantee does not include any consequential costs.

Foot notes:

1. Your statutory rights entitle you to a one year guarantee period only.
2. The UK mainland consists of England, Scotland and Wales only. Please note that for the purposes of this definition, Northern Ireland, Isle of Man and Scilly Isles are not considered part of the UK mainland.
3. We recommend that your solar thermal system is serviced every twenty four months (even when the guarantee has expired) to prolong the lifespan and ensure it is operating safely and efficiently.
4. The guarantee period will commence from the date of installation, unless the installation date is more than six months from the date of purchase, in which case the guarantee period will commence six months from the date of purchase.
5. This is a normal physical effect that can occur in certain weather conditions and unit parameters, irrespective of the operating status of the collector (panel). It does not affect collector (panel) performance.

Revision 1.0
December 2014

APPENDIX A SOLAR FLUID

Grant Solar Fluid is a ready to use heat transfer fluid for flat plate solar heating systems.

Product Description

Ready to use mono propylene glycol based heat transfer medium for solar heating applications with organic corrosion inhibitors to protect against high temperature degradation and low temperature conditions within solar panel installations. The product is inhibited without the use of borates, nitrites, amines, silicates and phosphates. Grant Solar Fluid is formulated to withstand extreme temperatures during period stagnation within solar collectors. The fluid is produced to provide freeze protection to -23°C. The product is suitable for flat plate solar heating systems.

- Protects against corrosion and limescale
- Provides excellent efficiency and extends system life
- Non-Toxic, environmentally friendly

Corrosion Protection

Grant Solar Fluid contains an optimized inhibitor package to ensure maximum and long lasting corrosion and the formation of boiler scale at both high and low temperature. Grant Solar Fluid is based on organic inhibitor technology which is completely different from traditional inhibitor technology. The corrosion inhibitor of traditional technology forms an isolating film on the interior of the installation. This means they are consumed over time, and require repeated renewal to maintain corrosion protection. Organic inhibitors on the other hand, protect metals against corrosion by acting selectively by forming a monomolecular protection layer on the location where corrosion has a tendency to start. This means that the inhibitor is used only where needed and therefore the rest of the inhibitor remains in reserve which gives a much longer corrosion protection life than traditional inhibitor technologies.

The effectiveness of the inhibitor is proven via the corrosion test method ASTM D1384 (American Society for Testing and Materials)

As for most heat transfer fluids, the use of zinc or materials using zinc is not recommended for pipes or any other part of the installation.

ASTM D1384 glassware corrosion tests	Weight loss in mg/coupon ¹					ASTM D1384
	Brass	Copper	Solder	Steel	Cast Iron	
'Industry limit (max)'	10	10	30	10	10	Industry Limit
Grant Solar Fluid	1.1	1.2	0.9	0.3	-0.5	

1. Weight loss AFTER chemical cleaning. Weight gain is indicated by a - sign.

Compatibility and Mixing

Grant Solar Fluid is compatible with most other heat transfer fluids based on propylene glycol.

Exclusive use of Grant Solar Fluid is recommended for optimal corrosion protection. This heat transfer fluid is compatible with European hard tap waters, up to a water hardness of 30° dH (German hardness degrees equivalent to 535 mg/l CaCO₃).

Approved Elastomer Compatibility

Standard qualities of the following classes of polymers are compatible with our Grant Solar Fluid: Nitrile rubber (NBR), Hydrogenated nitrile rubber (HNBR), Acrylate rubber (ACM), Silicone rubber (MVQ), Fluorocarbon rubber, commonly referred to as Viton (FPM), Ethylene Propylene Diene rubber (EPDM), Butyl rubber (IIR), Natural rubber (NR), Styrene Butadiene rubber (SBR), Polychloroprene rubber, often referred to as Neoprene (CR), Polytetrafluorethylene, commonly known as Teflon (PTFE), Polyethylene, low density and high density (LDPE and HDPE), Polypropylene (PP), Polyvinylchloride (PVC), Polyamide (PA), Polyester resins (UP)

Maximum and minimum usage temperatures in MPG and water based dilutions depend on the quality of the elastomer and should be requested of the manufacturer. Inform the manufacturer of the pH of the product and the sustained maximal pressures in the system when submitting your request.

Chemical and Physical Properties

Properties	Grant Solar Fluid	Method	Properties	Grant Solar Fluid	Method
Freezing Point	-23°C	ASTM D1177	Specific Heat	3.73kJ/Kg-K	Internal
Kinematic Viscosity	4.5cSt @ 20°C 0.93cSt @ 80°C	DIN 51562 DIN 51562	Specific gravity, 20°C	1.037 typ g/cm3	ASTM D1122
Equilibrium Boiling Point	108°C typ.	ASTM D1120	Thermal Conductivity 20°C	0.49W/mK	Internal
Nitrite, amine, phosphate	Nil	IC	pH	8.8 typ.	ASTM D1287
Colour	Pink	Visual	Refractive Index, 20°C	1.445 typ.	ASTM D1218

Servicing and Monitoring Fluid Condition

Grant Solar Fluid can be used effectively in systems for many years. It is recommended that the fluid is checked annually with a refractometer to test for freeze protection.

Storage Requirements

The product should be stored at ambient temperatures and periods of exposure to temperatures above 35°C should be minimized. As with any antifreeze coolant, the use of galvanized steel is not recommended for pipes or any other part of the storage/mixing installation

Grant Solar Fluid can be stored for minimum 8 years in unopened containers without any effect on the product quality or performance. It is strongly recommended to use new containers and not recycled ones.

Toxicity and Safety

For detailed Toxicity and Safety Data we refer to the Material Safety Data Sheet. The transport is not regulated.

All information contained in this Product Information Leaflet is accurate to the best of our knowledge and belief as at the date of issue specified.

However, the Company makes no warranty or representation, express or implied, as to the accuracy or completeness of such information.

Notes for Solar Heating Installations

Grant Solar Fluid is suitable for use in flat plate solar installations.

- Systems should meet the DIN 4757 requirements, designed as closed loop circuits due to the effects of air within systems leads to consuming the fluid at an increased rate.
- Membrane pressure systems must conform to DIN4807
- The use of galvanized steel is not recommended for pipes or any other part of the storage/mixing installation
- Systems should be pressure tested for leaks, flushed and cleaned prior to filling ensuring to remove all residues and fluxes present.
- Gas and air should be removed using a method of venting
- Avoid sustained stagnation as this effects the life span of the heat transfer medium
- Avoid mixing with other products and top up with water
- Refractometers or Hydrometers can be used to test the freeze protection levels

APPENDIX B PRODUCT FICHE

Product fiche concerning the COMMISSION DELEGATED REGULATIONS

(EU)No 811/2013 of 18 February 2013

(EU)No 812/2013 of 18 February 2013

SOLAR

Information requirements for Solar Devices units	
Model	Grant Solar Thermal
Model Identifier	Sahara
Collector aperture area	2.13 m ²
Zero-loss efficiency	0.826 (82.6%)
First Order coefficient	4.441 W/(m ² K)
Second Order coefficient	0.008 W/(m ² K)
Incidence angle Modifier	0.933
Pump power consumption	28 W
Standby power consumption	<1 W

END OF LIFE INFORMATION – SOLAR THERMAL DEVICES

General

Grant solar thermal devices incorporate components manufactured from a variety of different materials. The majority of these materials can be recycled whilst the smaller remainder cannot.

Materials that cannot be recycled must be disposed of according to local regulations using appropriate waste collection and/or disposal services.

Disassembly

There is little risk to those involved in the disassembly of the system if the process is undertaken with care and reasonable precautions are taken.

Before disassembly of the system please refer to and follow the De-commissioning information given in the Installation Instructions provided with the system.

RECYCLING

Many of the materials used in Grant solar thermal systems can be recycled, as listed below:

	Component	Material
Collector:	Collector outer frame	Aluminium alloy
	Absorber plate/pipes	Copper/Aluminium alloy
	Glass	Low iron glass
Solar Fluid:	Only dispose of the used solar fluid (40% Glycol/water solution) at a licensed recycling or disposal centre. DO NOT dispose of the solar fluid into a household drainage system, controlled water (e.g. rivers or streams), or any other drainage system (e.g. storm drain, sewer, etc.).	
Pump:	Solar circulating pumps must not be disposed of in normal domestic waste as most of the materials used in their construction can be recycled. For details on how to responsibly dispose of the pump please go to the pump manufacturers website where guidance is provided.	

Disposal

All materials other than those listed above must be disposed of responsibly as general waste.



Neil Sawers
Technical Manager

Grant solar fiche. V1.0 24/07/15.

APPENDIX C

INSTALLATION OF FIREPROOF MEMBRANE (IN-ROOF SYSTEMS ONLY)

C.1 GENERAL INFORMATION

Membrane Specification	
Material	Envirograf FB30 fire barrier material
Manufacturer	Envirograf (Intumescent Systems Ltd.), Envirograf House, Barfrestone, Dover, Kent, CT15 7JG
Width	1220mm
Length	To ensure that the fireproof membrane extends approximately 100mm beyond the extremities of the in-roof cassette, you will need to purchase the correct length of material.

Adhesive Specification	
Product name	IA (Intumescent Adhesive)
Manufacturer	Envirograf (Intumescent Systems Ltd.), Envirograf House, Barfrestone, Dover, Kent, CT15 7JG
Size	310ml
Colour	White
Qty required	12.5ml per metre (application on one side of membrane)

! NOTE !

The above mentioned FB30 Fireproof membrane and IA adhesive is available through most major Builders merchants. It is not available directly from Grant UK.

C.2 MATERIAL LENGTH

! NOTE !

For the correct length of material required for the number of solar panels to be installed, refer to Table C-1 for Portrait installations or Table C-2 for Landscape installations.

Table C-1: Portrait installations					
Qty of panels	1	2	3	4	5
Total length of material (m)	5.3	7.95	10.6	13.25	15.9

Table C-2: Landscape installations					
Qty of panels	1	2	3	4	5
Total length of material (m)	5.25	7.0	10.5	14.0	17.5

C.3 INSTALLATION PROCEDURE

! NOTE !

This information MUST be used in conjunction with the installation procedure for the In-roof system given in Sections 6.2 and 6.3 of these installation instructions.

1. Install the timber battens that form the substructure for the in-roof cassette, as described in Section 6.2 of these installation instructions.
2. Cut the length of material into the required number of equal lengths - as per either Table C-3 (Portrait installations) or Table C-4 (Landscape installations).

Table C-3: Portrait installations					
Qty of panels	1	2	3	4	5
Number of cut lengths required	2	3	4	5	6
Length of each cut length (mm)	2650	2650	2650	2650	2650

Table C-4: Landscape installations					
Qty of panels	1	2	3	4	5
Number of cut lengths required	3	4	6	8	10
Length of each cut length (mm)	1750	1750	1750	1750	1750

3. Position the first bottom flashing on the bottom batten. Where the bottom flashing consists of more than one section, the sections overlap where they join with the left overlapping the right. DO NOT stick the sections of the bottom flashing together at this stage.
4. Adjust the overall width of the bottom flashing to suit - see Table 6-4. 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.
5. Using a pencil, mark the position of both ends of the bottom flashing on the batten. Then mark a distance of 100mm further out from each end of the bottom flashing.
6. Remove the bottom flashing from the batten for the time being.
7. Starting from the left-hand side of the installation, position the first section of membrane to run vertically up the roof with the left-hand edges on the 100mm mark. Ensure that this first section runs at right angles to the roof battens and that it extends 250mm down from the top edge of batten 01. See Figure C-1. Then fix it in place with either small screws, tacks or small nails at each corner.

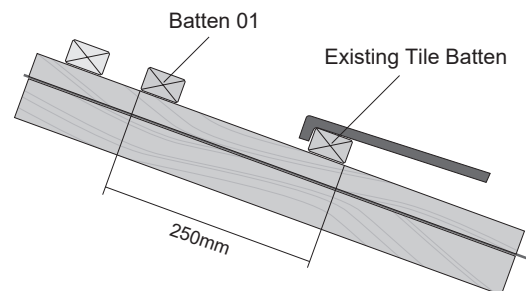


Figure C-1: Fireproof membrane extends down 250mm from top of batten 01

8. The sections are to be joined with a 50mm overlap using the IA adhesive.

9. Prepare the first overlap joint by evenly applying the IA adhesive up the entire length on the right-hand side of the first section, and the underside of the left-hand side of the second section, as per the Application Instructions provided with the adhesive.
10. Place the second section in place ensuring an even overlap of approx. 50mm all the way up and top and bottom edges are flush with the first section. Press down on the overlap to ensure the two sections are stuck together over the entire length of the joint between the two sections.
Then fix the right-hand side of the second section in place with either small screws, tacks or small nails at each corner.

11. Repeat this process to join the remaining sections. Refer to Section C.4 or C.5, as required.
12. When all sections are in place the excess material must be trimmed off the right-hand end of the membrane, to leave it 100mm beyond the right-hand end of the bottom flashing, i.e. lining up with the pencil mark on the batten made in step 5 of this procedure.
13. Once the membrane is trimmed, the bottom flashing can be fitted, as described in Section 6.3 of these installation instructions, and the installation completed.

C.4 VERTICAL INSTALLATIONS

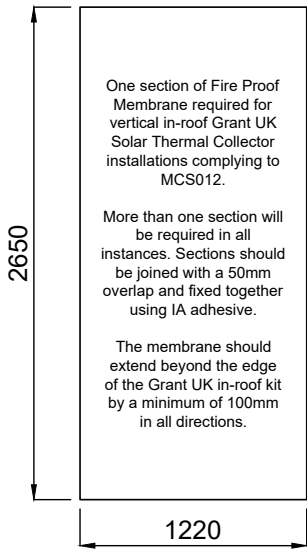


Figure C-2: One section of Fireproof membrane required for vertical installations

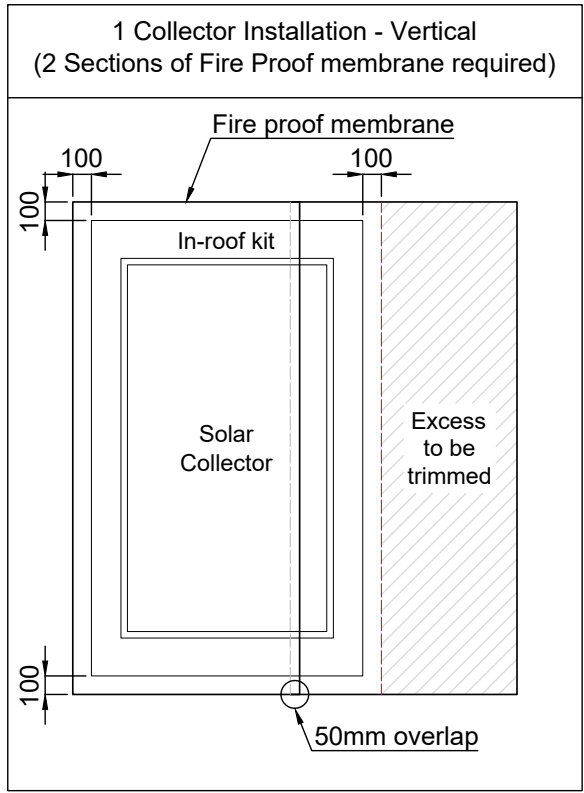


Figure C-3: 1 Collector installation - Vertical

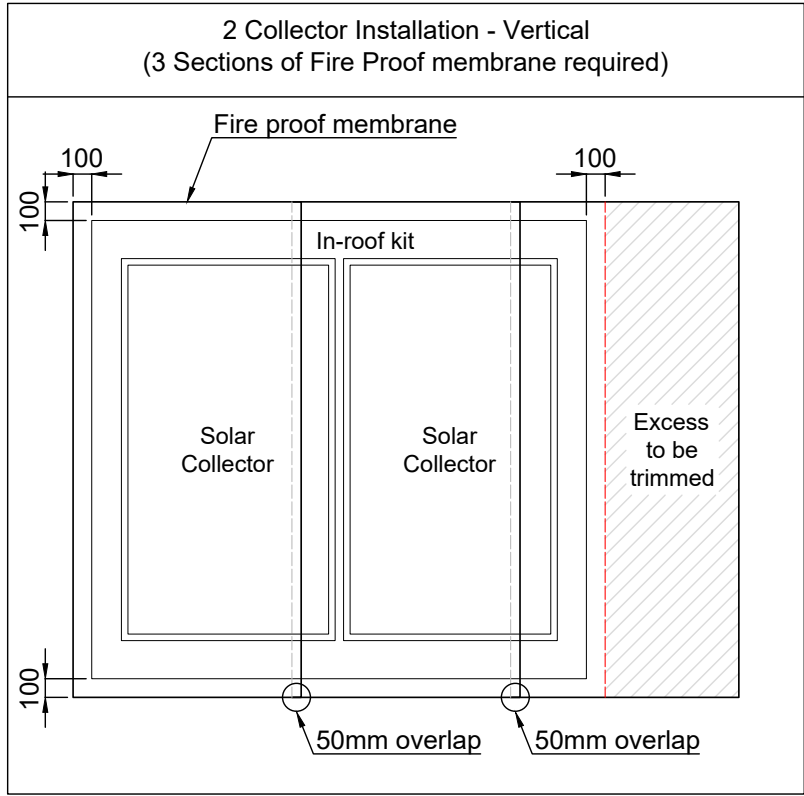


Figure C-4: 2 Collector installation - Vertical

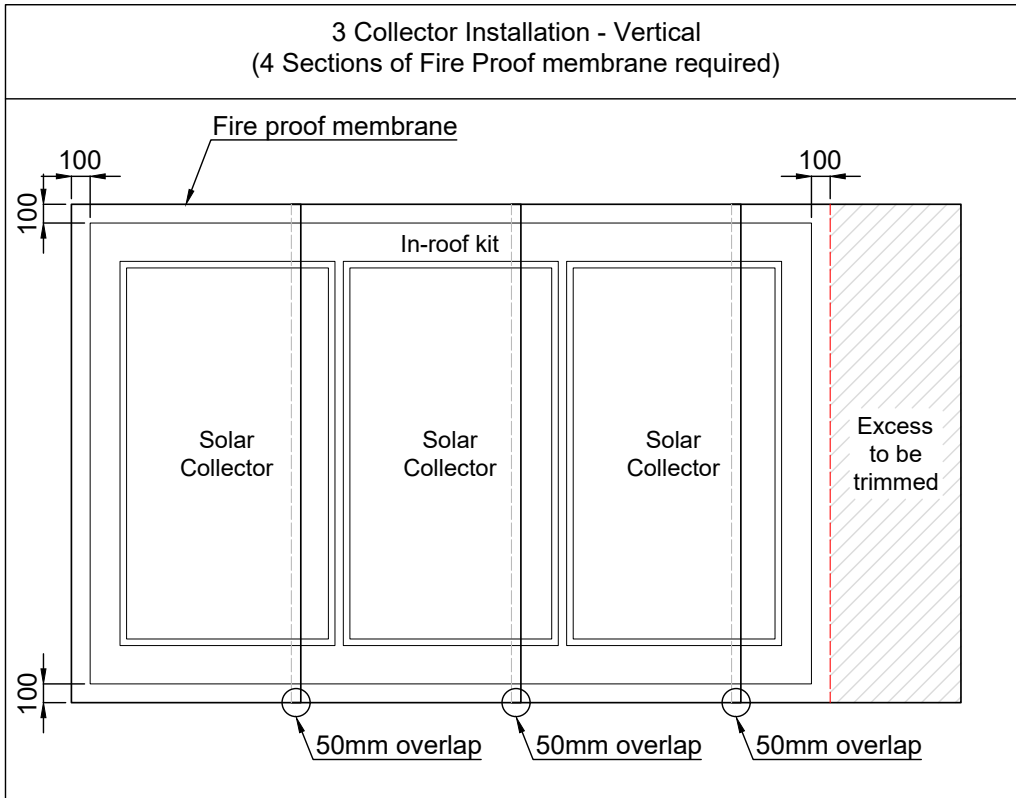


Figure C-5: 3 Collector installation - Vertical

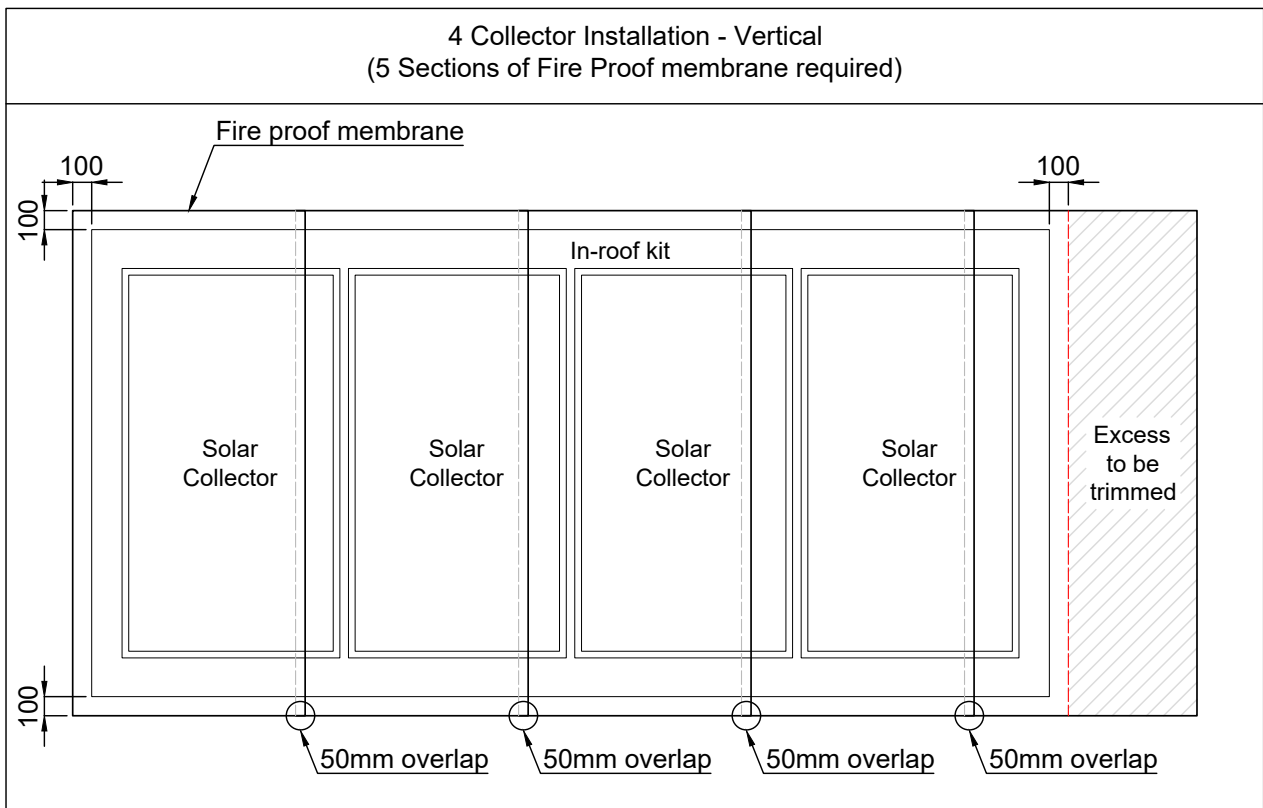


Figure C-6: 4 Collector installation - Vertical

5 Collector Installation - Vertical
(6 Sections of Fire Proof membrane required)

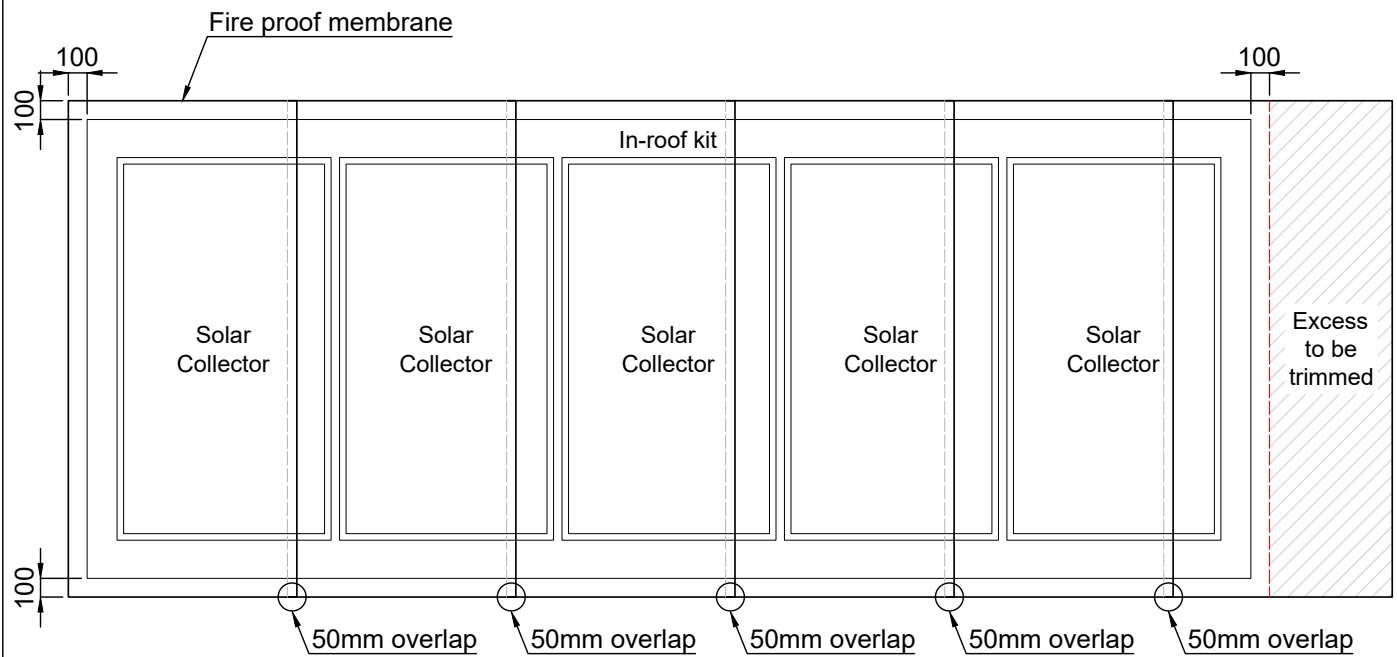


Figure C-7: 5 Collector installation - Vertical

C.5 HORIZONTAL INSTALLATIONS

1 Collector Installation - Horizontal
(3 Sections of AA rated Fire Proof Membrane required)

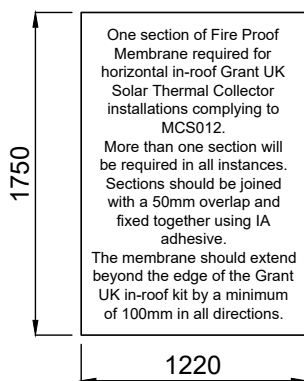


Figure C-8: One section of Fireproof membrane required for horizontal installations

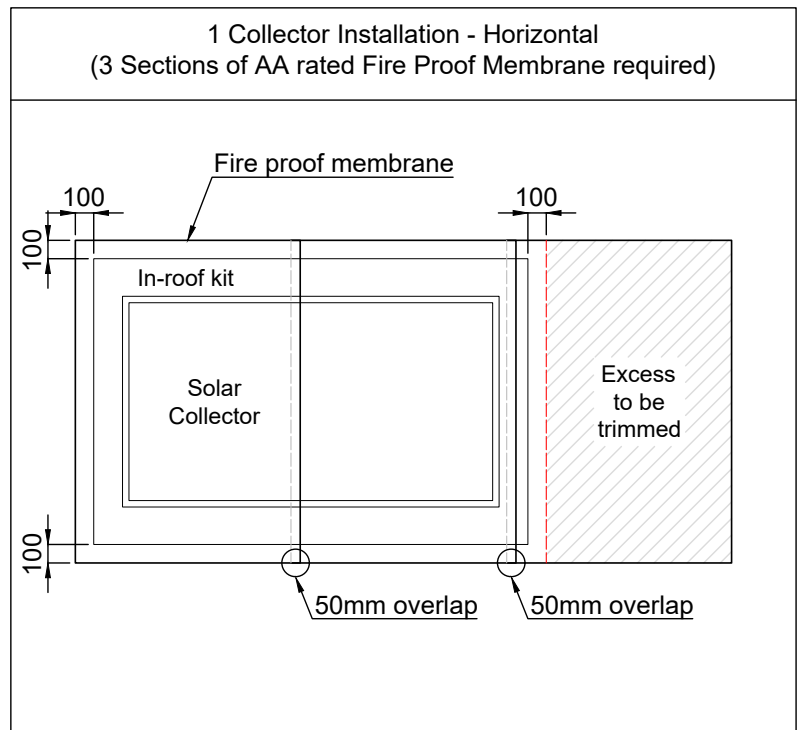


Figure C-9: 1 Collector installation - Horizontal

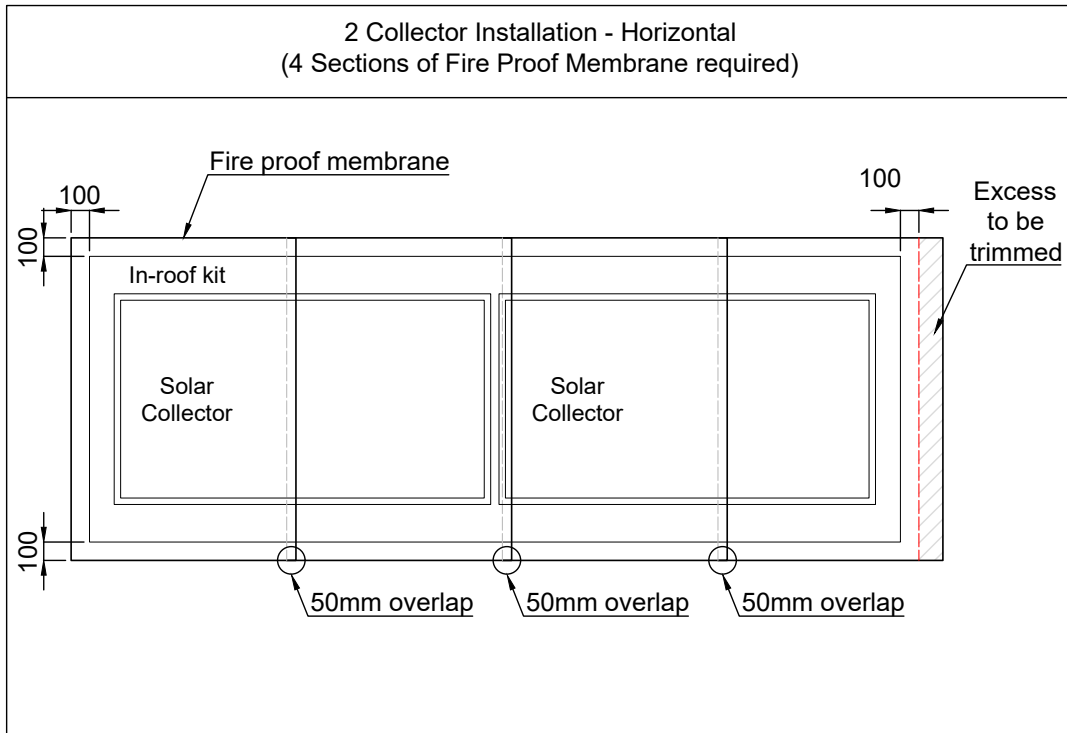


Figure C-10: 2 Collector installation - Horizontal

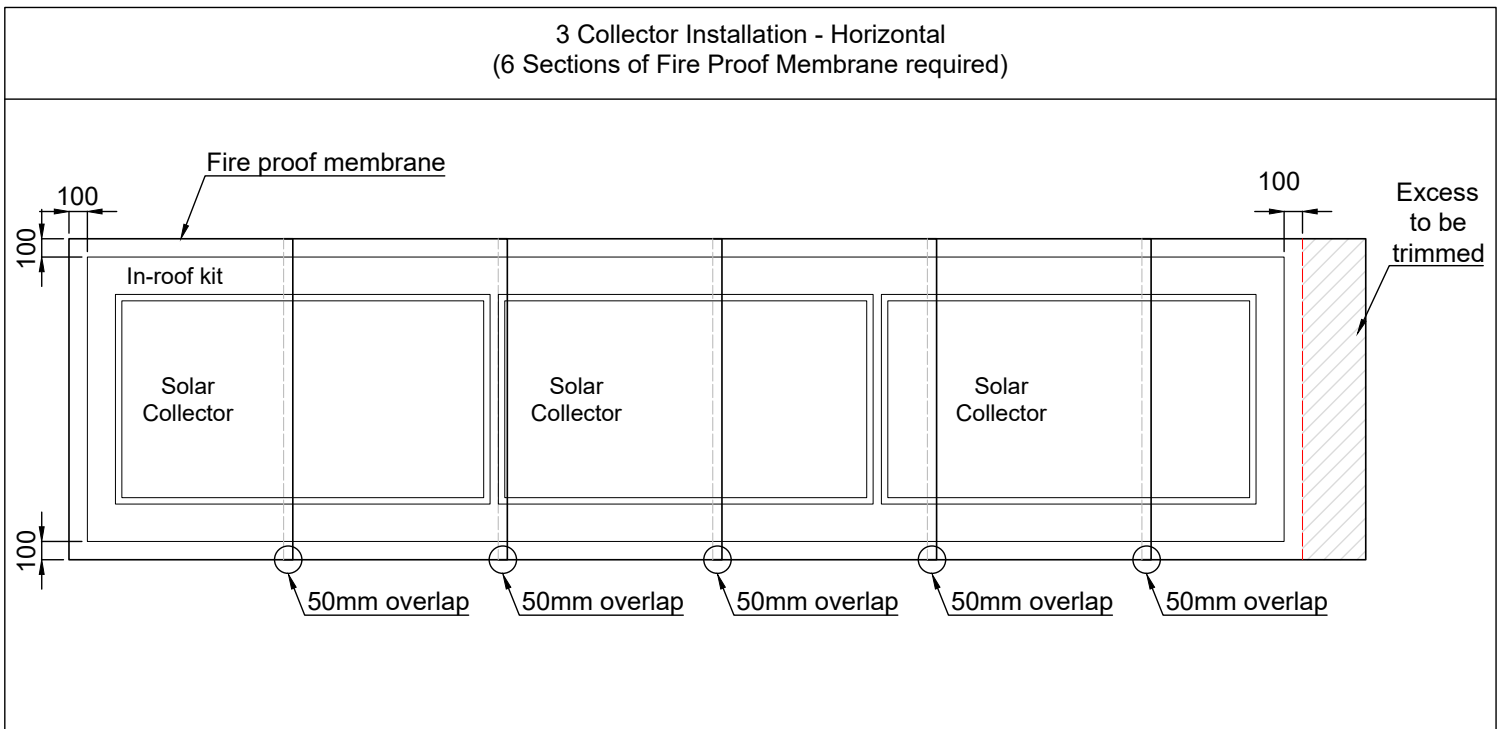


Figure C-11: 3 Collector installation - Horizontal

4 Collector Installation - Horizontal
(8 Sections of Fire Proof Membrane required)

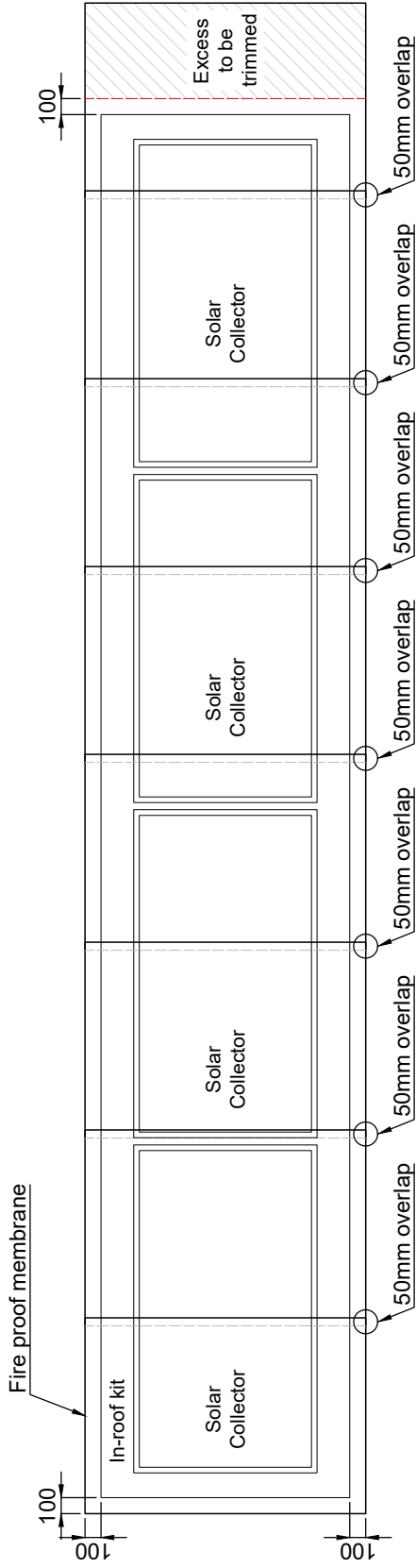


Figure C-12: 4 Collector installation - Horizontal

5 Collector Installation - Horizontal
(10 Sections of Fire Proof Membrane required)

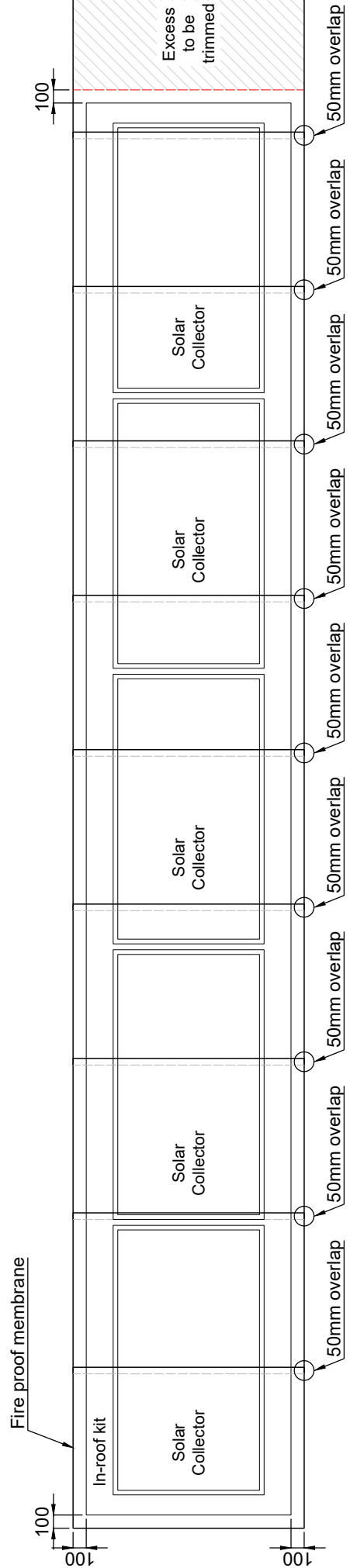


Figure C-13: 5 Collector installation - Horizontal



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