With-Pitch Frames

FOR THERMOSIPHON SOLAR WATER HEATER SYSTEMS

WITH 2.0 m^2 SOLAR COLLECTORS – ENVELOPE OR FOLDED-TRAY

WIND REGIONS A TO D

INSTALLATION INSTRUCTIONS

ENVELOPE®
SOLAR COLLECTOR

This frame must be installed by a qualified person.
Please leave this guide with the householder or responsible officer.

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PATENTS

This With-Pitch frame may be protected by one or more patents or registered designs in the name of Solahart Industries Pty Ltd or Rheem Australia Pty Ltd.

TRADE MARKS

Note: Every care has been taken to ensure accuracy in preparation of this publication.
No liability can be accepted for any consequences, which may arise as a result of its application.

CONTENTS

HOUSEHOLDER or RESPONSIBLE OFFICER – This installation instruction booklet is intended for the installer but you may find it of interest.

ABOUT THE WITH-PITCH FRAME

MODEL TYPE

The With-Pitch frames for thermosiphon solar water heaters are designed for pitched roof installations. This installation instruction covers the installation of frames, using the "On Roof Mounting" method, suitable for a thermosiphon solar water heater with one or two 2.0m^2 collectors.

There are two main frame mounting systems. A 'one collector frame' is suitable for a tank and one collector installation and a 'two collector frame' is suitable for a tank and two collector installation.

The overall dimensions of the frame with a solar water heater installed are:

- One Collector 2.0 m² frame 1.76 m wide x 2.5 m long (deep)
- Two Collector 2.0 m² frame 2.3 m wide x 2.5 m long (deep)

On Roof Mounting

The "On Roof Mounting" method is **not** suitable for tile, slate, shingle and similar roof types.

The installer must ensure the structural integrity of the building is not compromised and the roof structure is suitable to carry the full weight of the frame and thermosiphon solar water heater when full of water. If in doubt, consult a structural engineer, who may specify suitable strengthening of the roof structure.

The frame and the thermosiphon solar water heater when full of water, can weigh up to:

- 180 litre tank with one collector 331 kg
- 300 litre tank with two collectors 552 kg

Wind Regions and Ratings

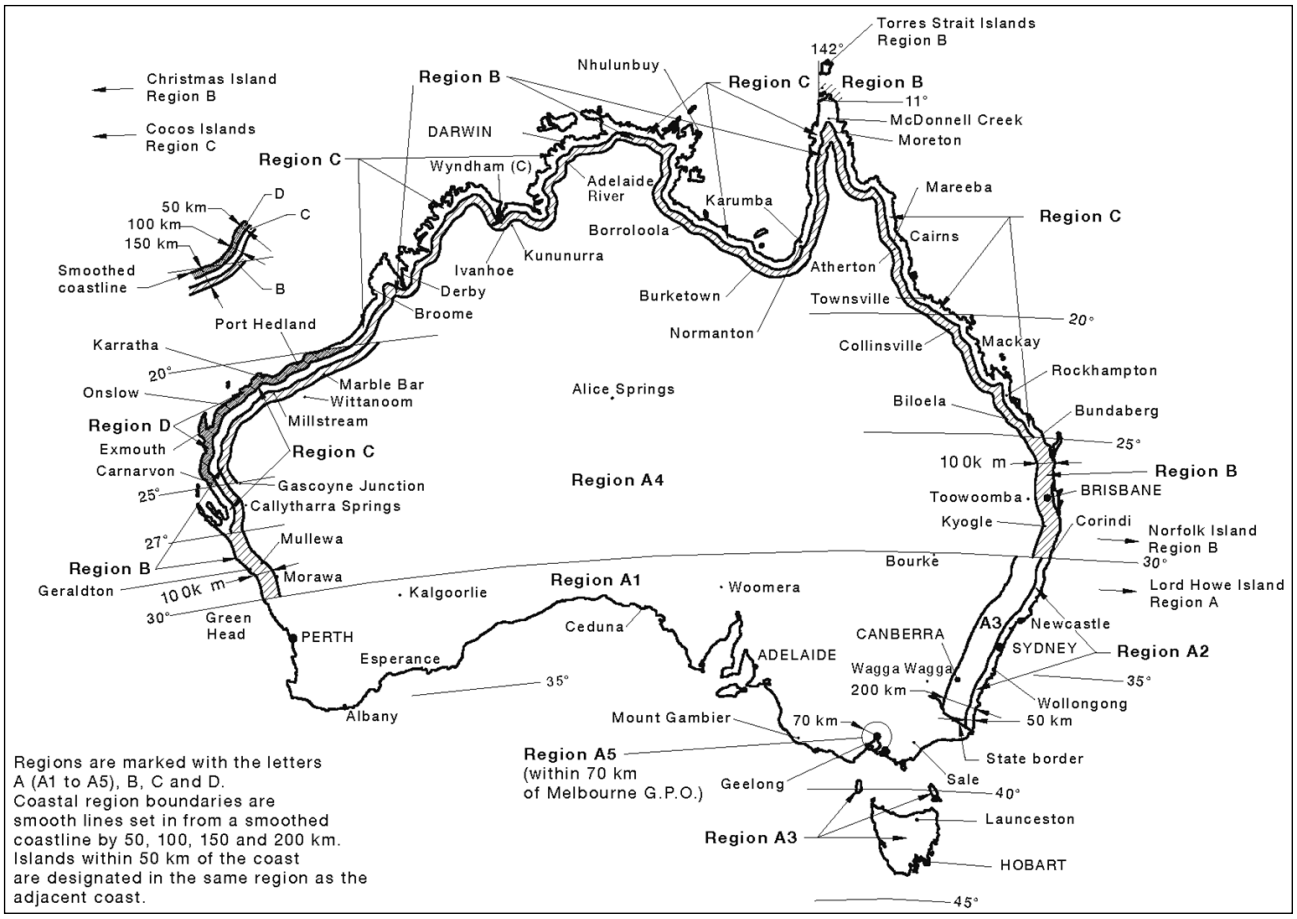
The frame, when installed using the "On Roof Mounting" method and the certified fixing methods and in accordance with these installation instructions, may be rated to:

Wind Region D		Ultimate Wind Speed	Height (h)	Frame Design Rated to		Base Building to be Rated to	
Terrain category	TC1.5	93.3 m/s	≤ 10 m	Wind Class *	N6/C4	Wind Class *	>N6/C4
Terrain category	TC2	88.0 m/s	≤ 10 m	Wind Class *	N6/C4	Wind Class *	>N6/C4
Terrain category	TC2.5	80.5 m/s	≤ 10 m	Wind Class *	N5/C3	Wind Class *	N6/C4
Terrain category	T3	73.0 m/s	≤ 10 m	Wind Class *	N4/C2	Wind Class *	N5/C3

Wind Region C		Ultimate Wind Speed	Height (h)	Frame Design Rated to		Base Building to be Rated to	
Terrain category	TC1.5	73.1 m/s	≤ 10 m	Wind Class *	N4/C2	Wind Class *	N5/C3
Terrain category	TC2	69.0 m/s	≤ 10 m	Wind Class *	N4/C2	Wind Class *	N5/C3
Terrain category	TC2.5	63.1 m/s	≤ 10 m	Wind Class *	N4/C2	Wind Class *	N5/C3
Terrain category	T3	57.3 m/s	≤ 10 m	Wind Class *	N3/C1	Wind Class *	N4/C2

* Wind Class has been assessed in accordance with AS 4055-2012 'Wind loads for housing'.

The suitability for the installation in a wind region will be based upon the terrain category, average building height, building aspect ratio, roof cladding, rafter / truss spacing, batten / purlin types and the fasteners used. Refer to "Building Aspect Ratio" on page 6 and "Rafter / Truss Spacings, Batten / Purlin Types and Fastener Requirements" on page 8.



Wind Regions in Australia

LOCATION

This frame (where the “On Roof Mounting” method is used), subject to its design criteria and certification not being exceeded:

- may be suitable for installation in geographic locations up to and within Wind Region D as defined in the National Construction Code, Australian Standard AS 4055-2012 and the Australian / New Zealand Standard AS/NZS 1170.2:2011, and
- may provide an acceptable method of installation where it is necessary to satisfy the requirements of the National Construction Code, or equivalent requirements.

Refer to “System Certifications” on page 57 for information on the certification of the frames.

Orientation

Refer to the Installation Instructions and Owner’s Guide supplied with the solar water heater in order to determine the most suitable direction for facing the system.

Note: The Base Sections of the frame are designed to be installed perpendicular to the profile of the roof sheet cladding. The fixing holes in the Base Sections are positioned to sit directly over the crests of the profile. This means the orientation of the frame will be in the direction of the slope of the roof.

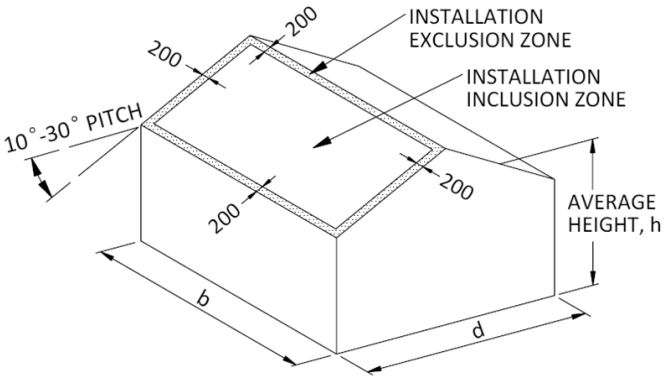
Choose a mounting location with direction in mind that will also allow the frame to be located over roof battens / purlins which are continuous over not less than three rafters or trusses (for either a one or two collector frame) and provide the Base Plate sub-assemblies with suitable fixing access to the roof battens / purlins.

Positioning the Frame – Set-Back
The frame must be installed with a minimum distance or set-back from the edge of the roof (discontinuity) to the solar storage tank and solar collector on all four sides.

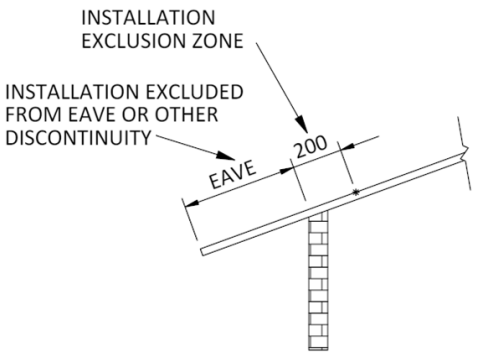
- The minimum set-back from a discontinuity is 200 mm.
- A discontinuity is the inside edge of an eave (i.e. the outside wall below the roof), a ridge, or a hip of the roof.
- If the roof has an eave, the set-back from the edge of the roof is the minimum set-back plus the eave depth.

Refer to "Model Type" on page 4 for the overall dimensions of a solar water heater on a frame.

If the frame is required to be installed nearer to the eaves, ridge or hip of the roof than the minimum set-back distance allows (i.e. in the Installation Exclusion Zone), then further structural engineering assessment is required. Consult a structural engineer for an assessment before installation commences.



h/b ≤ 0.5 or h/d ≤ 0.5
set-backs from eaves, ridge and hip



set-back from roof edge at eaves

Building Aspect Ratio
The building aspect ratio is the ratio of average roof height (h) to the shorter of the building depth (d) or width (b), i.e. h / (d or b) (refer to the diagram 'set-backs from eaves, ridge and hip' on page 6).

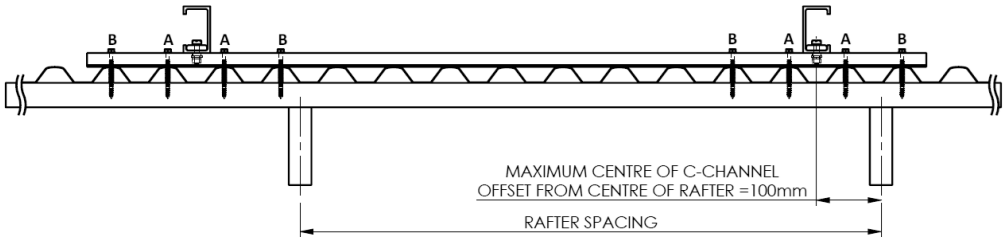
Anywhere Within Inclusion Zone and Rafter Centre Offset Installations
A frame may be suitable for installation 'Anywhere Within Inclusion Zone' or limited to a 'Rafter Centre Offset' installation depending upon the spacing between the rafters / trusses, the type of batten used, the wind region, height of the installation and building aspect ratio.

The tables under "Steel Batten / Purlin Fixing Options" on page 13 and "Timber Batten / Purlin Fixing Options" on page 18 show whether an installation can be anywhere within inclusion zone (AWIZ) or whether the installation cannot exceed a maximum rafter centre offset distance from the centreline of a rafter / truss.

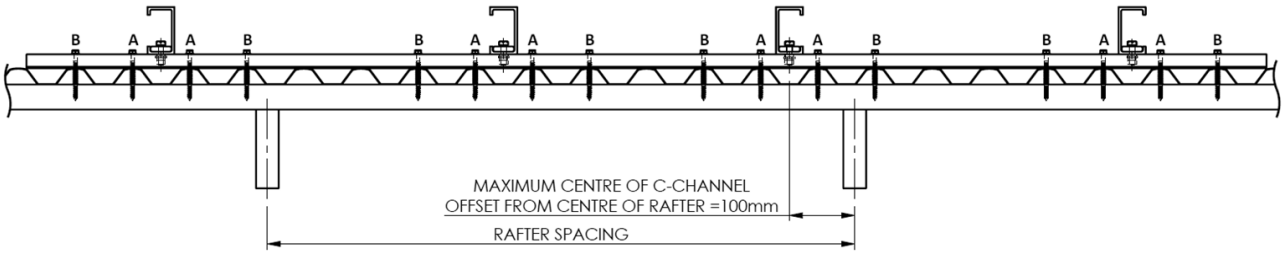
An anywhere within inclusion zone installation can be installed on the roof without reference to the position of the rafters / trusses, so long as it does not encroach within the installation exclusion zone – refer to "Positioning the Frame – Set-Back" on page 6.

A rafter centre offset installation references a maximum distance between the centreline of a frame C-channel (note: this must be one of the two middle C-channels of a two collector frame) and the centreline of a rafter / truss.

Refer to the single collector frame – rafter centre offset and double collector frame – rafter centre offset diagrams on page 7.



single collector frame – rafter centre offset



double collector frame – rafter centre offset

IMPORTANT NOTES, GENERAL DESIGN CRITERIA AND LIMITATIONS

- These frames are designed for the installation of thermosiphon solar water heaters with one or two 2.0m^2 Envelope or folded-tray solar collectors.
- The roof construction should be assessed to ensure that it can support the additional loads imposed by the installation of the thermosiphon solar water heater and the frame.
- The installation shall be in accordance with these installation instructions, the NCC, regulatory authority requirements and local codes.
- The frames certification in Wind Regions C and D covers roof pitch angles from 10° to 30°.
- The certification of the frame is based on its installation providing a minimum set-back of 200 mm from the inside edge of the eaves (i.e. external wall), ridge, and hip of the roof to the solar storage tank and solar collector.

  Note: If the frame is to be mounted nearer to the edge of the roof and the minimum set-back cannot be achieved, then further structural engineering assessment is required. Consult a structural engineer for an assessment.
- Truss and rafter spacing must not exceed the maximum spacing as specified in “Steel Batten / Purlin Fixing Options” commencing on page 13 and “Timber Batten / Purlin Fixing Options” commencing on page 18, dependent on the batten or purlin type.
- The frames certification in Wind Regions C and D covers roof batten / purlin spacing up to 900 mm between centres.
- The roof battens / purlins must be continuous over not less than three rafters or trusses for both one and two collector frames.
- The frame has been structurally assessed when fixed to a number of batten and purlin types using various types of fasteners. The installer must provide the specified fasteners to connect the frame to the roof battens / purlins. Refer to “Rafter / Truss Spacings, Batten / Purlin Types and Fastener Requirements” on page 8.
- The connection of the frame to the roof battens / purlins must be in accordance with the methods and drawings outlined in these installation instructions.
- The frame is not rated for installation on a free roof or canopy as defined in AS/NZS 1170.2:2011 Appendix A and AS/NZS 1170.2:2011 subclause 1.4.
- The certifications of the frames cover their installation in Australia.

RAFTER / TRUSS SPACINGS, BATTEN / PURLIN TYPES AND FASTENER REQUIREMENTS

Rafter / Truss Spacings and Batten / Purlin Types

The certification of this frame covers its installation on both steel and timber battens / purlins of various sizes and types. The maximum allowable truss and rafter spacing for the various steel and timber battens / purlins, and the types and number of fasteners required, based on maximum average roof height and terrain category, are listed in:

- Steel Batten / Purlin Fixing Options on page 13.
- Timber Batten / Purlin Fixing Options on page 18.

Fastener Requirements

The frame is suitable for installations on metal sheet roof profiles with crest to crest centre measurements of 76.4 mm, 87.5 mm, and 190.5 mm. The holes and slots in the base plates of the frames have been positioned to suit these three metal roof sheet profiles. They may be used on other metal sheet roof profiles if the holes and slots in the base plates sit on the crest of the roof profiles and allow sufficient fixing points to secure them in accordance with the tables in these installation instructions.

Refer to “Fasteners and Requirements” on page 29.

SOLAR WATER HEATER SYSTEMS

The With-Pitch frame system is suitable for installation with the thermosiphon solar water heaters listed below, including rebranded systems using the same tank designs. The table lists the kits and the quantities required for each thermosiphon solar water heater.

		Kits supplied for frame system				
	Sales BOM ordered	**1210 7002**	**1210 7003**	**1210 7006**	**1210 3998**	**1210 3999**
Rheem Thermosiphon Systems – VE Tank						
52C180, 52D180 tank – one collector	1 x 204010	1	-	1	-	-
52C300, 52D300 tank – two collectors	1 x 204011	-	1	2	-	-
Rheem Thermosiphon Systems – SS Tank						
52H180, 52L180 tank – one collector	1 x 204014	1	-	1	1	-
52H300, 52L300 tank – two collectors	1 x 204015	-	1	2	-	1
Solahart Thermosiphon Systems – VE Tank						
180F, 180J, 180L, 180LF tank – one collector	1 x 204010	1	-	1	-	-
300F, 300J, 300L, 300LF tank – two collectors	1 x 204011	-	1	2	-	-

Note: SS = stainless steel VE = vitreous enamel lined

ONE AND TWO COLLECTOR SYSTEM INSTALLATIONS

The frame systems and the kits required are:

- **204010** **Frame With-Pitch 1 Collector 2.0m^2 Thermosiphon VE Cat D**, consisting of
  1 x 12107006 Kit With-Pitch Frame C-Channels Thermo Reg D
  1 x 12107002 Kit With-Pitch Frame Base 1 Collector Thermo Reg D

- **204011** **Frame With-Pitch 2 Collector 2.0m^2 Thermosiphon VE Cat D**, consisting o**f**
  2 x 12107006 Kit With-Pitch Frame C-Channels Thermo Reg D
  1 x 12107003 Kit With-Pitch Frame Base 2 Collector Thermo Reg D

- **204014** **Frame With-Pitch 1 Collector 2.0m^2 Thermosiphon SS Cat D**, consisting of
  1 x 12107006 Kit With-Pitch Frame C-Channels Thermo Reg D
  1 x 12107002 Kit With-Pitch Frame Base 1 Collector Thermo Reg D
  1 x 12103998 Kit Frame Mounting 180 SS Tank Reg D

- **204015** **Frame With-Pitch 2 Collector 2.0m^2 Thermosiphon SS Cat D**, consisting of
  2 x 12107006 Kit With-Pitch Frame C-Channels Thermo Reg D
  1 x 12107003 Kit With-Pitch Frame Base 2 Collector Thermo Reg D
  1 x 12103999 Kit Frame Mounting 300 SS Tank Reg D

PARTS SUPPLIED

The kits that make up the With-Pitch frame system contain the parts required, including Tank Clamps, Collector Clamps, screws, washers and nuts, for assembling the frame and attaching the solar storage tank and solar collectors to the frame.

The Tank Clamps, Collector Clamps, screws, washers and nuts supplied with the kits must be used with these frames. They replace the equivalent components that may be supplied in the parts kit or pipe kit supplied with the solar water heater, which must not be used with these frames.

Refer to "List of Components" on page 11.

Notes

- The kits do not include the fasteners for fixing the frame to the roof.
- Not all of the parts supplied will be used in the installation:
  - The Tank Clamps, Collector Clamps and some fixings used will depend upon the type of storage tank and solar collector(s) installed.

    Refer to "Assembly Diagrams" on page 36.
  - The plastic bag marked 204235 contains spare components of set screws, nuts and washers. These are supplied to cover the loss of components on site.

TANK FRAME MOUNTING KIT

The Rheem 52H and 52L solar stainless steel tanks require a tank frame mounting kit to be assembled to the flat base of these tanks. When assembled onto the tank, the reinforcement provides additional strength to the foot of the tank (refer to the diagram "Solar Storage Tank with Flat Base and Reinforcement Plate / Angle" on page 35).

The kit part numbers are:

- 12103998 Tank Frame Mounting Kit 52H180, 52L180
- 12103999 Tank Frame Mounting Kit 52H300, 52L300

LIST OF COMPONENTS

The contents of the With-Pitch Frame C-Channel kit for all model tanks are:

Component Part No	12107006 Kit With-Pitch Frame C-Channels Thermo Reg D Component Description	Quantity
204467	Cyclone U channel thermo – slotted	2

The contents of the With-Pitch Frame base kits for all model tanks are:

Component Part No	Kit With-Pitch Frame Base Thermo Reg D Component Description	Kit 12107002 1 Collector	Kit 12107003 2 Collector
204222	Base plate sub-assembly aluminium 1 collector system	2	-
204223	Base plate sub-assembly aluminium 2 collector system	-	2
204435	Collector rail envelope / FT 1 collector frame	1	-
204436	Collector rail envelope / FT 2 collector frame	-	1
204407	Tank / collector rail envelope / FT 1 collector frame	1	-
204408	Tank / collector rail envelope / FT 2 collector frame	-	1
	Contents of polyethylene bags (used for assembly)	4	4
209113	Set screw Hex M8 x 50 mm SS 304	6	12
209114	Set screw Hex M8 x 30 mm (G304)	8	16
209118	Nut M8 x 1.25 mm (G304)	10	20
209125	Washer spring 8 x 14.3 x 2 mm (G304)	14	28
209124	Washer flat 8 mm (G304)	10	20
209122	Washer rectangular 65 x 32 x 8 mm – aluminium	10	20
204424	Clamp envelope collector – collector rail	2	4
204428	Clamp folded-tray collector – tank rail	2	4
204431	Clamp folded-tray collector – collector rail	2	4
080071	Screw Tek 14 G x 20 TPI x 22	2	4
344121	Tank clamp aluminium assy	2	2
207521	Installation instructions – With-Pitch frame thermosiphon	1	1
	Contents of polyethylene bag 204235 (spare components only)	1	1
209113	Set screw Hex M8 x 50 mm SS 304	2	2
209114	Set screw Hex M8 x 30 mm (G304)	2	2
209118	Nut M8 x 1.25 mm (G304)	2	2
209124	Washer flat 8 mm (G304)	2	2
209125	Washer spring 8 x 14.3 x 2 mm (G304)	2	2

The contents of the frame mounting kits for the stainless steel tanks are:

Component Part No	Kit Frame Mounting SS Tanks Component Description	12103998 180 SS Tank Mounting Kit	12103999 300 SS Tank Mounting Kit
343060	Tank strap long cyclone	2	2
343238	Front reinforcement plate 180 SS tank	1	-
343240	Front reinforcement plate 300 SS tank	-	1
343239	Rear reinforcement angle 180 SS tank	1	-
343241	Rear reinforcement angle 300 SS tank	-	1
	Contents of polyethylene bag	1	1
343203	Tank strap rear bracket	2	2
204660	Tank clamp galvanised	2	4
080071	Screw Tek 14G x 22 mm	2	4
080167	Screw Tek 10 G x 16 mm	9	12
209114	Set screw M8 30 mm SS 304	2	2
209118	Nut M8” SS	2	2
126420	Installation instructions – SS tank frame mounting	1	1

Note: The kits do not include the fasteners for fixing the frame to the roof.

RAFTER / TRUSS SPACINGS AND BATTEN / PURLIN TYPES

TERRAIN CATEGORY

The terrain category for a housing site is a measure of the lowest effective surface roughness from any radial direction within a distance of 500 m of the proposed housing site.

From the Australian New Zealand Standard, AS / NZS 1170.2:2011 Structural design actions – Part 2: Wind actions, the terrain category for a housing site is identified by the notation TC1, TC1.5, TC2, TC2.5 or TC3. The terrain category is taken to include what type of development will occur over the next five years. For example, if a new housing estate is created in what was open land (TC2 or TC2.5), then the first homes built can be treated as being part of a built-up suburban housing area (TC3), although at the time of their construction they are in a TC2 or TC2.5 situation.

Substantial well established trees may be considered as obstructions for evaluation of terrain category in all wind regions.

Terrain Categories are defined as:

Terrain Category 1 (TC1): Very exposed open terrain with few or no obstructions and enclosed limited sized water surfaces at serviceability and ultimate wind speeds in all wind regions, e.g. flat, treeless, poorly grassed plains, or river, canals, lakes and enclosed bays, extending less than 10 km in the wind direction.

Terrain Category 1.5 (TC1.5): Open water surfaces subjected to shoaling waves at serviceability and ultimate wind speeds in all wind regions, e.g. near-shore water, large unenclosed bays on seas and oceans, lakes and enclosed bays extending greater than 10 km in the wind direction.

Terrain Category 2 (TC2): Open terrain including grassland with well-scattered obstructions having heights generally from 1.5 m to 5 m with no more than two obstructions per hectare, e.g. farmland and cleared subdivisions with isolated trees and uncut grass.

Terrain Category 2.5 (TC2.5): Terrain with a few trees or isolated obstructions. This category is intermediate between TC2 and TC3 and represents the terrain in developing outer urban areas with scattered houses, or large acreage developments with fewer than 10 buildings per hectare.

Terrain Category 3 (TC3): Terrain with numerous closely spaced obstructions having heights generally from 3 m to 10 m. The minimum density of obstructions shall be at least the equivalent of 10 house-size obstructions per hectare, e.g. suburban housing or light industrial estates.

Terrain Category 4 (TC4): Terrain with numerous large, high (10 m to 30 m tall) and closely-spaced constructions, such as large city centres and well-developed industrial complexes.

In urban situations, roads, rivers, small lakes or canals less than 200 m wide are considered to form part of normal ‘Terrain Category 3’ terrain. Parks and other open spaces less than 250,000 m^2 in area are also considered to form part of normal ‘Terrain Category 3’ terrain provided they are not within 500 m of each other, or not within 500 m of open country. Housing sites less than 200 m from the boundaries of open areas larger than 250,000 m^2, e.g. golf courses, that are completely surrounded by urban terrain, are considered to have the terrain category applicable to the open area itself. Shielding provisions may still apply to these sites.

Housing sites less than 500 m from the edge of a development shall be classified as the applicable terrain that adjoins the development, i.e. TC1, TC1.5, TC2, TC2.5 or TC3, as applicable. For information on the terrain category of a particular site, contact your local council.

STEEL BATTEN / PURLIN FIXING OPTIONS

General

- **Rafter centre offset** = the maximum allowable distance of 100 mm between the centreline of a frame C-channel (note: this must be one of the two middle C-channels of a two collector frame) and the centreline of a rafter / truss and without encroachment into the installation exclusion zone – refer to “Positioning the Frame – Set-Back” on page 6.
- **AWIZ** = does not have a rafter centre offset requirement and can be installed anywhere within inclusion zone and without encroachment into the installation exclusion zone – refer to “Positioning the Frame – Set-Back” on page 6.
- Refer to diagram “set-backs from eaves, ridge and hip” on page 6, for h, d, b.
- Steel battens / purlins must be fixed to the rafter / truss in accordance with the batten / purlin manufacturers specifications or as detailed in these installation instructions.
- Batten connections to rafters / trusses are to meet the connection capacities of the frame and water heater installation. Refer to “Batten to Rafter Fixing Options” on page 23 for information on batten fixing details.
- Refer to diagram C-Channel to Base Plate Connection Positions on page 42 for acceptable positions of the front and rear Base Plates.
- Fasteners may be either RoofZips, Teks screws or M8 / 5/16” bolts, washers and nuts. Refer to the section “Fasteners and Requirements” commencing on page 29 for the specification of the RoofZips, Teks screws and bolts.
- A RoofZip or Teks screw is to have a minimum penetration through the steel batten / purlin of 12 mm. A bolt is to have a minimum 13 mm penetration past the underside of the batten or purlin material for the nut and washer.
- Refer to the following tables for the number of fasteners required per Base Plate and for limitations.
- The steel batten / purlin fixing options for Wind Region C can also be used for Wind Regions A and B.
- Where steel battens have a limitation due to terrain category or maximum truss / rafter spacing or fastener type, suitable additional timber battens can be used for the attachment of the Base Plates. Refer to the “Timber Batten / Purlin Fixing Options” on page 18.

Steel Batten / Purlin Fixings – Wind Region C – Single Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 Wind Region C – Batten Connection Details to Timber Rafter / Truss" on page 23, or
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region C – Batten Connection Details to Steel Rafter / Truss" on page 24

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION C – STEEL BATTENS
THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
C450LO 40 x 40 x 2.5 SHS Steel Batten Fixing Options					
TC1.5, TC2, TC2.5, TC3	h ≤ 10m	1200	1200	4	4
40 x 0.75 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	700	700	8	8
	5m < h ≤ 10m	600	600	4 x M8 bolts	8
TC2	h ≤ 5m	700	1000	8	8
	5m < h ≤ 10m	600	600	8	8
TC2.5	h ≤ 5m	800	1000	8	8
	5m < h ≤ 10m	700	1000	8	8
TC3	h ≤ 10m	900	1000	8	8
TS6175 0.75 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	8	8
	5m < h ≤ 10m	1200	1200	4 x M8 bolts	8
TC2, TC2.5, TC3	h ≤ 10m	1200	1200	8	8
TS6110 1.0 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 10m	1200	1200	8	8
TC2	h ≤ 5m	1200	1200	8	4
	5m < h ≤ 10m	1200	1200	8	8
TC2.5	h ≤ 10m	1200	1200	8	4
TC3	h ≤ 10m	1200	1200	4	4
TS9675 0.75 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	8	8
	5m < h ≤ 10m	1200	1200	4 x M8 bolts	8
TC2, TC2.5, TC3	h ≤ 10m	1200	1200	8	8
TS9610 1.0 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 10m	1200	1200	8	8
TC2	h ≤ 5m	1200	1200	8	4
	5m < h ≤ 10m	1200	1200	8	8
TC2.5	h ≤ 10m	1200	1200	8	4
TC3	h ≤ 10m	1200	1200	4	4

Note

- If required, the minimum 8 x self-drilling metal screws can be replaced by 4 x M8 bolts.

Steel Batten / Purlin Fixings – Wind Region C – Double Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region C – Batten Connection Details to Timber Rafter / Truss" on page 23, or
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region C – Batten Connection Details to Steel Rafter / Truss" on page 24

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION C – STEEL BATTENS
THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
C450LO 40 x 40 x 2.5 SHS Steel Batten Fixing Options					
TC1.5, TC2, TC2.5, TC3	h ≤ 10m	1200	1200	8	8
40 x 0.75 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	600	600	8 x M8 bolts	16
	5m < h ≤ 10m	N/A	600	8 x M8 bolts	8 x M8 bolts
TC2	h ≤ 5m	700	700	16	16
	5m < h ≤ 10m	600	600	8 x M8 bolts	16
TC2.5	h ≤ 10m	700	700	16	16
TC3	h ≤ 10m	800	800	16	16
TS6175 0.75 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1100	1200	8 x M8 bolts	16
	5m < h ≤ 10m	1000	1000	8 x M8 bolts	8 x M8 bolts
TC2	h ≤ 5m	1200	1200	16	16
	h ≤ 10m	1100	1100	8 x M8 bolts	16
TC2.5, TC3	h ≤ 10m	1200	1200	16	16
TS6110 1.0 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5, TC2, TC2.5, TC3	h ≤ 10m	1200	1200	16	16
TS9675 0.75 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	8 x M8 bolts	16
	5m < h ≤ 10m	1200	1200	8 x M8 bolts	8 x M8 bolts
TC2	h ≤ 5m	1200	1200	16	16
	5m < h ≤ 10m	1200	1200	8 x M8 bolts	16
TC2.5, TC3	h ≤ 10m	1200	1200	16	16
TS9610 1.0 mm BMT G550 Steel or Equivalent Top Hat Batten Fixing Options					
TC1.5, TC2, TC2.5	h ≤ 10m	1200	1200	16	16
TC3	h ≤ 10m	1200	1200	16	8

Note

- If required, the minimum 16 x self-drilling metal screws can be replaced by 8 x M8 bolts.

Steel Batten / Purlin Fixings – Wind Region D – Single Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Timber Rafter / Truss" on page 25, or
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Steel Rafter / Truss" on page 26

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION D – STEEL BATTENS
THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
C450LO 40 x 40 x 2.5 SHS Steel Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	8	8
	5m < h ≤ 10m	1000	1100	8	8
TC2	h ≤ 5m	1200	1200	4	4
	5m < h ≤ 10m	1100	1200	8	8
TC2.5, TC3	h ≤ 10m	1200	1200	4	4
TS4075 0.75 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC3	h ≤ 10m	600	600	4 x M8 bolts	8
TS6175 0.75 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1000	1100	4 x M8 bolts	4 x M8 bolts
	5m < h ≤ 10m	900	1000	4 x M8 bolts	4 x M8 bolts
TC2	h ≤ 5m	1100	1200	4 x M8 bolts	4 x M8 bolts
	5m < h ≤ 10m	1000	1100	4 x M8 bolts	4 x M8 bolts
TC2.5	h ≤ 5m	1200	1200	4 x M8 bolts	8
	5m < h ≤ 10m	1100	1200	4 x M8 bolts	4 x M8 bolts
TC3	h ≤ 10m	1200	1200	4 x M8 bolts	8
TS6110 1.0 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	4 x M8 bolts	8
	5m < h ≤ 10m	1100	1200	4 x M8 bolts	4 x M8 bolts
TC2	h ≤ 5m	1200	1200	8	8
	5m < h ≤ 10m	1200	1200	4 x M8 bolts	4 x M8 bolts
TC2.5, TC3	h ≤ 10m	1200	1200	8	8
TS9675 0.75 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1, TC2	h ≤ 10m	1200	1200	4 x M8 bolts	4 x M8 bolts
TC2.5	h ≤ 5m	1200	1200	4 x M8 bolts	8
	5m < h ≤ 10m	1200	1200	4 x M8 bolts	4 x M8 bolts
TC3	h ≤ 10m	1200	1200	4 x M8 bolts	8
TS9610 1.0 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	4 x M8 bolts	8
	5m < h ≤ 10m	1200	1200	4 x M8 bolts	4 x M8 bolts
TC2	h ≤ 5m	1200	1200	8	8
	5m < h ≤ 10m	1200	1200	4 x M8 bolts	4 x M8 bolts
TC2.5, TC3	h ≤ 10m	1200	1200	8	8

Note

- If required, the minimum 8 x self-drilling metal screws can be replaced by 4 x M8 bolts.

Steel Batten / Purlin Fixings – Wind Region D – Double Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Timber Rafter / Truss" on page 25, or
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Steel Rafter / Truss" on page 26

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION D – STEEL BATTENS
THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
C450LO 40 x 40 x 2.5 SHS Steel Batten Fixing Options					
TC1.5	h ≤ 5m	1000	1000	16	16
	5m < h ≤ 10m	900	900	16	16
TC2	h ≤ 5m	1100	1100	16	16
	5m < h ≤ 10m	900	900	16	16
TC2.5	h ≤ 5m	1100	1100	16	8
	5m < h ≤ 10m	1100	1100	16	16
TC3	h ≤ 10m	1200	1200	8	8
TS4075 0.75 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC3	h ≤ 10m	N/A	600	8 x M8 bolts	8 x M8 bolts
TS6175 0.75 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	900	900	8 x M8 bolts	8 x M8 bolts
	5m < h ≤ 10m	800	800	8 x M8 bolts	8 x M8 bolts
TC2	h ≤ 5m	900	900	8 x M8 bolts	8 x M8 bolts
	5m < h ≤ 10m	800	800	8 x M8 bolts	8 x M8 bolts
TC2.5	h ≤ 5m	1000	1000	8 x M8 bolts	8 x M8 bolts
	5m < h ≤ 10m	900	900	8 x M8 bolts	8 x M8 bolts
TC3	h ≤ 10m	1000	1000	8 x M8 bolts	8 x M8 bolts
TS6110 1.0 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1000	1000	8 x M8 bolts	8 x M8 bolts
	5m < h ≤ 10m	900	900	8 x M8 bolts	8 x M8 bolts
TC2	h ≤ 5m	1100	1100	8 x M8 bolts	16
	5m < h ≤ 10m	1000	1000	8 x M8 bolts	8 x M8 bolts
TC2.5	h ≤ 5m	1200	1200	16	16
	5m < h ≤ 10m	1100	1100	8 x M8 bolts	8 x M8 bolts
TC3	h ≤ 10m	1200	1200	16	16
TS9675 0.75 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1.5	h ≤ 5m	1100	1100	8 x M8 bolts	8 x M8 bolts
	5m < h ≤ 10m	1000	1000	8 x M8 bolts	8 x M8 bolts
TC2	h ≤ 5m	1200	1200	8 x M8 bolts	8 x M8 bolts
	5m < h ≤ 10m	1100	1100	8 x M8 bolts	8 x M8 bolts
TC2.5, TC3	h ≤ 10m	1200	1200	8 x M8 bolts	8 x M8 bolts
TS9610 1.0 mm BMT G550 Steel Top Hat Batten Fixing Options					
TC1.5	h ≤ 10m	1200	1200	8 x M8 bolts	8 x M8 bolts
TC2	h ≤ 5m	1200	1200	8 x M8 bolts	16
	5m < h ≤ 10m	1200	1200	8 x M8 bolts	8 x M8 bolts
TC2.5	h ≤ 5m	1200	1200	16	16
	5m < h ≤ 10m	1200	1200	8 x M8 bolts	8 x M8 bolts
TC3	h ≤ 10m	1200	1200	16	16

Note

- If required, the minimum 16 x self-drilling metal screws can be replaced by 8 x M8 bolts.

TIMBER BATTEN / PURLIN FIXING OPTIONS

General

- **Rafter centre offset** = the maximum allowable distance of 100 mm between the centreline of a frame C-channel (note: this must be one of the two middle C-channels of a two collector frame) and the centreline of a rafter / truss and without encroachment into the installation exclusion zone – refer to “Positioning the Frame – Set-Back” on page 6.
- **AWIZ** = does not have a rafter centre offset requirement and can be installed anywhere within inclusion zone and without encroachment into the installation exclusion zone – refer to “Positioning the Frame – Set-Back” on page 6.
- Refer to diagram “set-backs from eaves, ridge and hip” on page 6, for h, d, b.
- Batten connections to rafters / trusses are to meet the connection capacities of the frame and water heater installation. Refer to “Batten to Rafter Fixing Options” on page 23 for information on batten fixing details.
- Refer to diagram C-Channel to Base Plate Connection Positions on page 42 for acceptable positions of the front and rear Base Plates.
- Fasteners may be either Teks screws or M8 / 5/16” bolts, washers and nuts. Refer to the section “Fasteners and Requirements” commencing on page 29 for the specification of the Teks screws and bolts.
- Refer to the following tables for the number of fasteners required per frame Base Plate and for limitations.
- Timber battens must be a minimum F17 grade J3 / JD4 Joint Group or LVL15 laminated veneer lumber J3 / JD4 Joint Group.
- Minimum embedment of Teks screws into timber batten is 25 mm for 38 x 75 mm timber or 35 x 75 mm LVL15, and 35 mm for 45 x 70 mm timber and larger or 46 x 75 mm LVL15.
- A bolt is to have a minimum 13 mm penetration past the underside of the batten or purlin material for the nut and washer.
- The timber batten / purlin fixing options for Wind Region C can also be used for Wind Regions A and B.
- Where steel battens have a limitation due to terrain category or maximum truss / rafter spacing or fastener type, suitable additional timber battens can be used for the attachment of the Base Plates. Refer to the “Steel Batten / Purlin Fixing Options” on page 13.

Timber Batten / Purlin Fixings – Wind Region C – Single Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 Wind Region C – Batten Connection Details to Timber Rafter / Truss" on page 23, or
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region C – Batten Connection Details to Steel Rafter / Truss" on page 24

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION C – TIMBER BATTENS
THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
38 x 75 F17 J3/JD4 Timber or 35 x 75 LVL15 Batten Fixing Options					
TC1.5	h ≤ 5m	800	1000	4	4
	5m < h ≤ 10m	700	1000	4	4
TC2	h ≤ 5m	800	1100	4	4
	5m < h ≤ 10m	800	1000	4	4
TC2.5, TC3	h ≤ 10m	800	1100	4	4
50 x 75 F17 J3/JD4 Timber or 46 x 75 LVL15 Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	4	4
	5m < h ≤ 10m	1100	1200	4	4
TC2, TC2.5, TC3	h ≤ 10m	1200	1200	4	4
45 x 70 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	1000	1100	4	4
	5m < h ≤ 10m	900	1000	4	4
TC2	h ≤ 5m	1000	1200	4	4
	5m < h ≤ 10m	1000	1100	4	4
TC2.5, TC3	h ≤ 10m	1000	1200	4	4
45 x 90 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	4	4
	5m < h ≤ 10m	1100	1200	4	4
TC2, TC2.5, TC3	h ≤ 10m	1200	1200	4	4
45 x 120 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5, TC2, TC2.5, TC3	h ≤ 10m	1200	1200	4	4
45 x 140 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5, TC2, TC2.5, TC3	h ≤ 10m	1200	1200	4	4

Timber Batten / Purlin Fixings – Wind Region C – Double Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region C – Batten Connection Details to Timber Rafter / Truss" on page 23, or
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region C – Batten Connection Details to Steel Rafter / Truss" on page 24

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION C – TIMBER BATTENS
THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
38 x 75 F17 J3/JD4 Timber or 35 x 75 LVL15 Batten Fixing Options					
TC1.5	h ≤ 10m	700	700	8	8
TC2	h ≤ 5m	800	800	8	8
	5m < h ≤ 10m	700	700	8	8
TC2.5, TC3	h ≤ 10m	800	800	8	8
50 x 75 F17 J3/JD4 Timber or 46 x 75 LVL15 Batten Fixing Options					
TC1.5	h ≤ 5m	1000	1000	8	8
	5m < h ≤ 10m	900	900	8	8
TC2	h ≤ 5m	1100	1100	8	8
	5m < h ≤ 10m	1000	1000	8	8
TC2.5, TC3	h ≤ 10m	1100	1100	8	8
45 x 70 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	900	900	8	8
	5m < h ≤ 10m	800	800	8	8
TC2	h ≤ 5m	900	900	8	8
	5m < h ≤ 10m	800	900	8	8
TC2.5, TC3	h ≤ 10m	900	900	8	8
45 x 90 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	1000	1000	8	8
	5m < h ≤ 10m	900	900	8	8
TC2	h ≤ 5m	1100	1100	8	8
	5m < h ≤ 10m	1000	1000	8	8
TC2.5, TC3	h ≤ 10m	1100	1100	8	8
45 x 120 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	8	8
	5m < h ≤ 10m	1100	1100	8	8
TC2, TC2.5, TC3	h ≤ 10m	1200	1200	8	8
45 x 140 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5, TC2, TC2.5, TC3	h ≤ 10m	1200	1200	8	8

Timber Batten / Purlin Fixings – Wind Region D – Single Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Timber Rafter / Truss" on page 25, or
  - "Thermosiphon Single Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Steel Rafter / Truss" on page 26

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION D – TIMBER BATTENS
THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
38 x 75 F17 J3/JD4 Timber or 35 x 75 LVL Batten Fixing Options					
TC1.5	h ≤ 5m	N/A	600	8	4
TC2	h ≤ 5m	600	600	4	4
TC2.5	h ≤ 5m	700	700	4	4
	5m < h ≤ 10m	600	600	4	4
TC3	h ≤ 10m	700	1000	4	4
50 x 75 F17 J3/JD4 Timber or 46 x 75 LVL Batten Fixing Options					
TC1.5	h ≤ 5m	900	1000	4	4
	5m < h ≤ 10m	800	1000	4	4
TC2	h ≤ 5m	1000	1100	4	4
	5m < h ≤ 10m	800	1000	4	4
TC2.5	h ≤ 5m	1100	1100	4	4
	5m < h ≤ 10m	1000	1100	4	4
TC3	h ≤ 10m	1100	1200	4	4
45 x 70 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	700	700	4	4
	5m < h ≤ 10m	600	600	4	4
TC2	h ≤ 5m	800	1000	4	4
	5m < h ≤ 10m	700	700	4	4
TC2.5	h ≤ 10m	800	1000	4	4
TC3	h ≤ 10m	900	1000	4	4
45 x 90 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	800	1000	4	4
	5m < h ≤ 10m	700	1000	4	4
TC2	h ≤ 5m	1000	1100	4	4
	5m < h ≤ 10m	800	1000	4	4
TC2.5	h ≤ 5m	1000	1100	4	4
	5m < h ≤ 10m	900	1100	4	4
TC3	h ≤ 10m	1100	1200	4	4
45 x 120 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	1100	1100	4	4
	5m < h ≤ 10m	900	1100	4	4
TC2	h ≤ 5m	1200	1200	4	4
	5m < h ≤ 10m	1000	1100	4	4
TC2.5, TC3	h ≤ 10m	1200	1200	4	4
45 x 140 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	1200	1200	4	4
	5m < h ≤ 10m	1100	1100	4	4
TC2, TC2.5, TC3	h ≤ 10m	1200	1200	4	4

Note – If required, the minimum 8 x screw fasteners can be replaced by 4 x M8 bolts.

Timber Batten / Purlin Fixings – Wind Region D – Double Thermo Collector Frame – h/d h/b ≤ 0.5

- Refer to the table
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Timber Rafter / Truss" on page 25, or
  - "Thermosiphon Double Collector With-Pitch Frame - h/d h/b ≤ 0.5 - Wind Region D – Batten Connection Details to Steel Rafter / Truss" on page 26

  for reference to the minimum batten to rafter connection detail for the range of rafter spacings.

WIND REGION D – TIMBER BATTENS
THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5

terrain category	max average height	max rafter and truss spacing for an anywhere within inclusion zone installation (AWIZ)	max rafter and truss spacing for a rafter off-set installation (off-set)	minimum screw fasteners per front base plate	minimum screw fasteners per rear base plate
38 x 75 F17 J3/JD4 Timber or 35 x 75 LVL Batten Fixing Options					
TC2	h ≤ 5m	600	600	16	8
TC2.5	h ≤ 5m	600	600	8	8
	5m < h ≤ 10m	600	600	16	8
TC3	h ≤ 10m	700	700	8	8
50 x 75 F17 J3/JD4 Timber or 46 x 75 LVL Batten Fixing Options					
TC1.5	h ≤ 5m	800	800	8	8
	5m < h ≤ 10m	700	700	16	16
TC2	h ≤ 5m	800	900	8	8
	5m < h ≤ 10m	700	800	8	8
TC2.5	h ≤ 5m	900	900	8	8
	5m < h ≤ 10m	800	800	8	8
TC3	h ≤ 10m	900	900	8	8
45 x 70 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	600	600	8	8
	5m < h ≤ 10m	600	600	16	16
TC2	h ≤ 5m	700	700	8	8
	5m < h ≤ 10m	600	600	8	8
TC2.5	h ≤ 5m	700	800	8	8
	5m < h ≤ 10m	700	700	8	8
TC3	h ≤ 10m	800	800	8	8
45 x 90 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	800	800	8	8
	5m < h ≤ 10m	700	700	16	16
TC2	h ≤ 5m	800	800	8	8
	5m < h ≤ 10m	700	700	8	8
TC2.5	h ≤ 5m	900	900	8	8
	5m < h ≤ 10m	800	800	8	8
TC3	h ≤ 10m	900	900	8	8
45 x 120 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	900	900	8	8
	5m < h ≤ 10m	800	800	16	16
TC2	h ≤ 5m	1000	1000	8	8
	5m < h ≤ 10m	900	900	8	8
TC2.5	h ≤ 10m	1000	1000	8	8
TC3	h ≤ 10m	1100	1100	8	8
45 x 140 F17 J3/JD4 Timber Batten Fixing Options					
TC1.5	h ≤ 5m	1000	1000	8	8
	5m < h ≤ 10m	900	900	16	16
TC2	h ≤ 5m	1100	1100	8	8
	5m < h ≤ 10m	1000	1000	8	8
TC2.5	h ≤ 5m	1100	1200	8	8
	5m < h ≤ 10m	1100	1100	8	8
TC3	h ≤ 10m	1200	1200	8	8

Note – If required, the minimum 16 x screw fasteners can be replaced by 8 x M8 bolts.

BATTEN TO RAFTER FIXING OPTIONS

The With-Pitch frame systems must be secured to suitable battens in accordance with the installation instructions to maintain the engineering certifications of the systems. The battens must be suitably secured to the roof rafters / trusses in accordance with the governing building codes and regulatory requirements.

BATTEN / PURLIN TO RAFTER / TRUSS CONNECTION CAPACITY

- The tables on the following pages show the maximum permitted distance between rafters / trusses for each type of batten / purlin connection to the rafter / truss.
- Illustrations and details of the Batten / Purlin to Rafter / Truss Connection Types referred to in the tables are shown commencing on page 27.
- Refer to the tables in Steel Batten / Purlin Fixing Options commencing on page 13 and Timber Batten / Purlin Fixing Options commencing on page 18, for the maximum permitted distance between rafters / trusses for each type of batten / purlin.
- The batten / purlin fixing to the roof rafters / trusses must meet AS1684.3 – 2010 residential timber-framed construction part 3: Cyclonic areas table 9.25 uplift capacity of roof batten tie-down connections.
- 'n/a' Denotes that Connection type is not permissible for the corresponding conditions.

THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION C – BATTEN CONNECTION DETAILS TO TIMBER RAFTER / TRUSS

terrain category	max average height	Maximum Timber Rafter / Truss Spacings for Batten to Rafter Connection Type								
		Timber and Steel Top Hat Battens					Steel SHS Batten			
connection type		Type 1 (5.06 kN)	Type 2 (10.12 kN)	Type 3 (4.7 kN)	Type 4 (13 kN)	Type 1 + Type 4 (18.06 kN)	Type 3 (4.7 kN)	2 x Type 3 (9.4 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	800	1200	700	1200	1200	700	1200	1200	1200
	5m < h ≤ 10m	600	1200	n/a	1200	1200	n/a	1200	1200	1200
TC2	h ≤ 5m	900	1200	800	1200	1200	800	1200	1200	1200
	5m < h ≤ 10m	700	1200	600	1200	1200	600	1200	1200	1200
TC2.5	h ≤ 5m	1000	1200	900	1200	1200	900	1200	1200	1200
	5m < h ≤ 10m	900	1200	800	1200	1200	800	1200	1200	1200
TC3	h ≤ 5m	1100	1200	1000	1200	1200	1000	1200	1200	1200
	5m < h ≤ 10m	1100	1200	1000	1200	1200	1000	1200	1200	1200

THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION C – BATTEN CONNECTION DETAILS TO TIMBER RAFTER / TRUSS

terrain category	max average height	Maximum Timber Rafter / Truss Spacings for Batten to Rafter Connection Type								
		Timber and Steel Top Hat Battens					Steel SHS Batten			
connection type		Type 1 (5.06 kN)	Type 2 (10.12 kN)	Type 3 (4.7 kN)	Type 4 (13 kN)	Type 1 + Type 4 (18.06 kN)	Type 3 (4.7 kN)	2 x Type 3 (9.4 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	n/a	900	n/a	1200	1200	n/a	900	1200	1200
	5m < h ≤ 10m	n/a	800	n/a	1000	1200	n/a	700	1000	1200
TC2	h ≤ 5m	n/a	1100	n/a	1200	1200	n/a	1000	1200	1200
	5m < h ≤ 10m	n/a	900	n/a	1200	1200	n/a	800	1200	1200
TC2.5	h ≤ 5m	600	1200	n/a	1200	1200	n/a	1100	1200	1200
	5m < h ≤ 10m	n/a	1100	n/a	1200	1200	n/a	1000	1200	1200
TC3	h ≤ 5m	600	1200	600	1200	1200	600	1200	1200	1200
	5m < h ≤ 10m	600	1200	600	1200	1200	600	1200	1200	1200

THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION C – BATTEN CONNECTION DETAILS TO STEEL RAFTER / TRUSS

terrain category	max average height	Maximum Steel Rafter / Truss Spacings for Batten to Rafter Connection Type					
		Timber and Steel Top Hat Battens					
steel rafter / truss grade		Truss 1.20 BMT			Truss 1.50 BMT		
connection type		Type 2 (5.95 kN)	Type 4 (13 kN)	Type 2 + Type 4 (18.95 kN)	Type 2 (6.84 kN)	Type 4 (13 kN)	Type 2 + Type 4 (19.84 kN)
TC1.5	h ≤ 5m	900	1200	1200	1100	1200	1200
	5m < h ≤ 10m	800	1200	1200	900	1200	1200
TC2	h ≤ 5m	1100	1200	1200	1200	1200	1200
	5m < h ≤ 10m	900	1200	1200	1000	1200	1200
TC2.5	h ≤ 5m	1200	1200	1200	1200	1200	1200
	5m < h ≤ 10m	1100	1200	1200	1200	1200	1200
TC3	h ≤ 5m	1200	1200	1200	1200	1200	1200
	5m < h ≤ 10m	1200	1200	1200	1200	1200	1200
		Timber and Steel Top Hat Battens				SHS Batten	
steel rafter / truss grade		Truss ≥1.90 BMT				All Trusses	
connection type		Type 1 (4.33 kN)	Type 2 (8.67 kN)	Type 4 (13 kN)	Type 1 + Type 4 (17.33 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	600	1200	1200	1200	1200	1200
	5m < h ≤ 10m	n/a	1200	1200	1200	1200	1200
TC2	h ≤ 5m	800	1200	1200	1200	1200	1200
	5m < h ≤ 10m	n/a	1200	1200	1200	1200	1200
TC2.5	h ≤ 5m	800	1200	1200	1200	1200	1200
	5m < h ≤ 10m	800	1200	1200	1200	1200	1200
TC3	h ≤ 5m	900	1200	1200	1200	1200	1200
	5m < h ≤ 10m	900	1200	1200	1200	1200	1200

THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION C – BATTEN CONNECTION DETAILS TO STEEL RAFTER / TRUSS

terrain category	max average height	Maximum Steel Rafter / Truss Spacings for Batten to Rafter Connection Type					
		Timber and Steel Top Hat Battens					
steel rafter / truss grade		Truss 1.20 BMT			Truss 1.50 BMT		
connection type		Type 2 (5.95 kN)	Type 4 (13 kN)	Type 2 + Type 4 (18.95 kN)	Type 2 (6.84 kN)	Type 4 (13 kN)	Type 2 + Type 4 (19.84 kN)
TC1.5	h ≤ 5m	n/a	1200	1200	600	1200	1200
	5m < h ≤ 10m	n/a	1000	1200	n/a	1000	1200
TC2	h ≤ 5m	600	1200	1200	700	1200	1200
	5m < h ≤ 10m	n/a	1200	1200	600	1200	1200
TC2.5	h ≤ 5m	700	1200	1200	800	1200	1200
	5m < h ≤ 10m	600	1200	1200	700	1200	1200
TC3	h ≤ 5m	700	1200	1200	900	1200	1200
	5m < h ≤ 10m	700	1200	1200	900	1200	1200
		Timber and Steel Top Hat Battens				SHS Batten	
steel rafter / truss grade		Truss ≥1.90 BMT				All Trusses	
connection type		Type 1 (4.33 kN)	Type 2 (8.67 kN)	Type 4 (13 kN)	Type 1 + Type 4 (17.33 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	n/a	800	1200	1200	1200	1200
	5m < h ≤ 10m	n/a	600	1000	1200	1000	1200
TC2	h ≤ 5m	n/a	900	1200	1200	1200	1200
	5m < h ≤ 10m	n/a	700	1200	1200	1200	1200
TC2.5	h ≤ 5m	n/a	1000	1200	1200	1200	1200
	5m < h ≤ 10m	n/a	900	1200	1200	1200	1200
TC3	h ≤ 5m	n/a	1200	1200	1200	1200	1200
	5m < h ≤ 10m	n/a	1200	1200	1200	1200	1200

THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION D – BATTEN CONNECTION DETAILS TO TIMBER RAFTER / TRUSS

terrain category	max average height	Maximum Timber Rafter / Truss Spacings for Batten to Rafter Connection Type							
		Timber and Steel Top Hat Battens					Steel SHS Batten		
connection type		Type 1 (5.06 kN)	Type 2 (10.12 kN)	Type 4 (13 kN)	Type 1 + Type 4 (18.06 kN)	Type 2 + Type 4 (23.12 kN)	2 x Type 3 (9.4 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	n/a	900	1200	1200	1200	900	1200	1200
	5m < h ≤ 10m	n/a	800	1100	1200	1200	800	1100	1200
TC2	h ≤ 5m	n/a	1100	1200	1200	1200	1000	1200	1200
	5m < h ≤ 10m	n/a	900	1200	1200	1200	800	1200	1200
TC2.5	h ≤ 5m	n/a	1200	1200	1200	1200	1200	1200	1200
	5m < h ≤ 10m	n/a	1100	1200	1200	1200	1000	1200	1200
TC3	h ≤ 5m	600	1200	1200	1200	1200	1200	1200	1200
	5m < h ≤ 10m	600	1200	1200	1200	1200	1200	1200	1200

THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION D – BATTEN CONNECTION DETAILS TO TIMBER RAFTER / TRUSS

terrain category	max average height	Maximum Timber Rafter / Truss Spacings for Batten to Rafter Connection Type							
		Timber and Steel Top Hat Battens					Steel SHS Batten		
connection type		Type 1 (5.06 kN)	Type 2 (10.12 kN)	Type 4 (13 kN)	Type 1 + Type 4 (18.06 kN)	Type 2 + Type 4 (23.12 kN)	2 x Type 3 (9.4 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	n/a	n/a	700	1000	1200	n/a	700	1200
	5m < h ≤ 10m	n/a	n/a	600	900	1100	n/a	600	900
TC2	h ≤ 5m	n/a	600	800	1200	1200	600	800	1200
	5m < h ≤ 10m	n/a	n/a	700	1000	1200	n/a	700	1200
TC2.5	h ≤ 5m	n/a	700	900	1200	1200	600	900	1200
	5m < h ≤ 10m	n/a	600	800	1200	1200	600	800	1200
TC3	h ≤ 5m	n/a	800	1000	1200	1200	700	1000	1200
	5m < h ≤ 10m	n/a	800	1000	1200	1200	700	1000	1200

THERMOSIPHON SINGLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION D – BATTEN CONNECTION DETAILS TO STEEL RAFTER / TRUSS

terrain category	max average height	Maximum Steel Rafter / Truss Spacings for Batten to Rafter Connection Type					
		Timber and Steel Top Hat Battens					
steel rafter / truss grade		Truss 1.20 BMT			Truss 1.50 BMT		
connection type		Type 2 (5.95 kN)	Type 4 (13 kN)	Type 2 + Type 4 (18.95 kN)	Type 2 (6.84 kN)	Type 4 (13 kN)	Type 2 + Type 4 (19.84 kN)
TC1.5	h ≤ 5m	n/a	1200	1200	600	1200	1200
	5m < h ≤ 10m	n/a	1100	1200	n/a	1100	1200
TC2	h ≤ 5m	600	1200	1200	700	1200	1200
	5m < h ≤ 10m	n/a	1200	1200	n/a	1200	1200
TC2.5	h ≤ 5m	700	1200	1200	800	1200	1200
	5m < h ≤ 10m	n/a	1200	1200	700	1200	1200
TC3	h ≤ 5m	800	1200	1200	900	1200	1200
	5m < h ≤ 10m	800	1200	1200	900	1200	1200
		Timber and Steel Top Hat Battens				SHS Batten	
steel rafter / truss grade		Truss ≥1.90 BMT				All Trusses	
connection type		Type 2 (8.67 kN)	Type 4 (13 kN)	Type 1 +Type 4 (17.33 kN)	Type 2 +Type 4 (21.67 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	800	1200	1200	1200	1200	1200
	5m < h ≤ 10m	700	1100	1200	1200	1100	1200
TC2	h ≤ 5m	900	1200	1200	1200	1200	1200
	5m < h ≤ 10m	800	1200	1200	1200	1200	1200
TC2.5	h ≤ 5m	1000	1200	1200	1200	1200	1200
	5m < h ≤ 10m	900	1200	1200	1200	1200	1200
TC3	h ≤ 5m	1200	1200	1200	1200	1200	1200
	5m < h ≤ 10m	1200	1200	1200	1200	1200	1200

THERMOSIPHON DOUBLE COLLECTOR WITH-PITCH FRAME - h/d h/b ≤ 0.5
WIND REGION D – BATTEN CONNECTION DETAILS TO STEEL RAFTER / TRUSS

terrain category	max average height	Maximum Steel Rafter / Truss Spacings for Batten to Rafter Connection Type					
		Timber and Steel Top Hat Battens					
steel rafter / truss grade		Truss 1.20 BMT			Truss 1.50 BMT		
connection type		Type 2 (5.95 kN)	Type 4 (13 kN)	Type 2 + Type 4 (18.95 kN)	Type 2 (6.84 kN)	Type 4 (13 kN)	Type 2 + Type 4 (19.84 kN)
TC1.5	h ≤ 5m	n/a	700	1100	n/a	700	1100
	5m < h ≤ 10m	n/a	600	900	n/a	600	900
TC2	h ≤ 5m	n/a	800	1200	n/a	800	1200
	5m < h ≤ 10m	n/a	700	1000	n/a	700	1100
TC2.5	h ≤ 5m	n/a	900	1200	n/a	900	1200
	5m < h ≤ 10m	n/a	800	1200	n/a	800	1200
TC3	h ≤ 5m	n/a	1000	1200	n/a	1000	1200
	5m < h ≤ 10m	n/a	1000	1200	n/a	1000	1200
		Timber and Steel Top Hat Battens				SHS Batten	
steel rafter / truss grade		Truss ≥1.90 BMT				All Trusses	
connection type		Type 2 (8.67 kN)	Type 4 (13 kN)	Type 1 + Type 4 (17.33 kN)	Type 2 + Type 4 (21.67 kN)	Type 4 (13 kN)	2 x Type 4 (26 kN)
TC1.5	h ≤ 5m	n/a	700	1000	1200	700	1200
	5m < h ≤ 10m	n/a	600	800	1000	600	1200
TC2	h ≤ 5m	n/a	800	1200	1200	800	1200
	5m < h ≤ 10m	n/a	700	900	1200	700	1200
TC2.5	h ≤ 5m	600	900	1200	1200	900	1200
	5m < h ≤ 10m	n/a	800	1200	1200	800	1200
TC3	h ≤ 5m	600	1000	1200	1200	1000	1200
	5m < h ≤ 10m	600	1000	1200	1200	1000	1200

BATTEN / PURLIN TO RAFTER / TRUSS CONNECTION TYPES

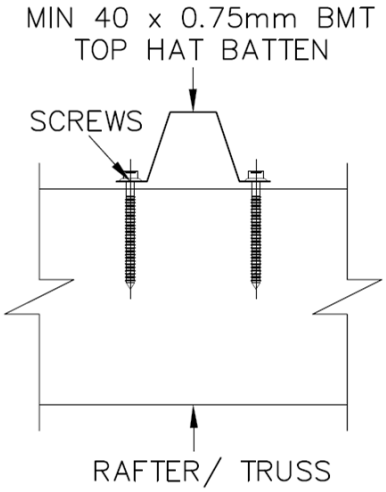
The preceding tables refer to the Types of Batten / Purlin Connections to the Rafter / Truss. These connection types are illustrated below.

The illustrations are not exhaustive and other types of connections may be used if the equivalent design forces as stated are met. Refer also to AS1684.3 – 2010 residential timber-framed construction part 3: Cyclonic areas table 9.25 uplift capacity of roof batten tie-down connections.

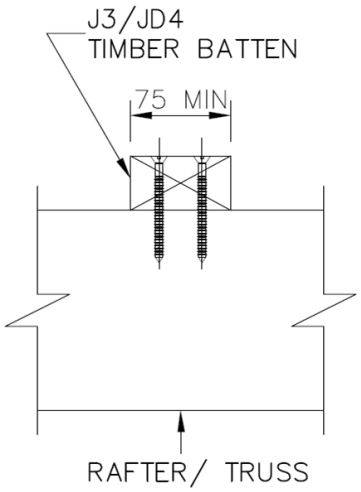
Type 1 – Two Screws – Batten / Purlin to Rafter / Truss Connection Type

For Timber Rafter / Truss
minimum J3/JD4 Rafter / Truss
2 x 14G screws, 35 mm embedment,
25 mm from timber edges
Capacity = 5.06 kN

For Steel Truss / Rafter
2 x 12G Teks screws
minimum 1.9mm BMT G450 Rafter / Truss – Capacity = 4.33 kN



Steel Top Hat Batten

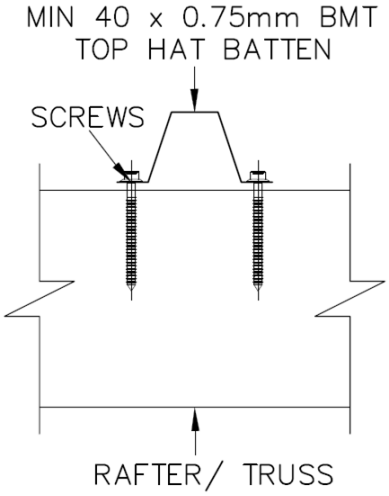


Timber Batten

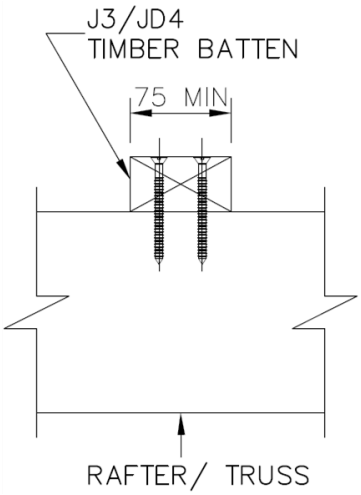
Type 2 – Four Screws – Batten / Purlin to Rafter / Truss Connection Type

For Timber Rafter / Truss
minimum J3/JD4 Rafter / Truss
4 x 14G screws, 35 mm embedment,
25 mm from timber edges
Capacity = 10.12 kN

For Steel Truss / Rafter
4 x 12G Teks screws
minimum 1.2 mm BMT G450 Rafter / Truss - Capacity = 5.95 kN
minimum 1.5 mm BMT G450 Rafter / Truss - Capacity = 6.84 kN
minimum 1.9 mm BMT G450 Rafter / Truss - Capacity = 8.67 kN



Steel Top Hat Batten

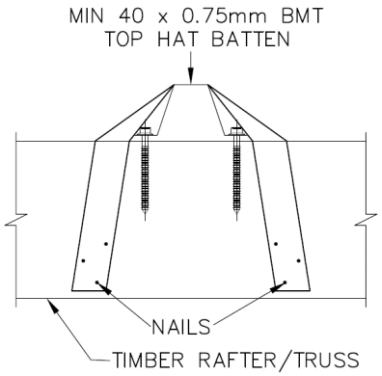


Timber Batten

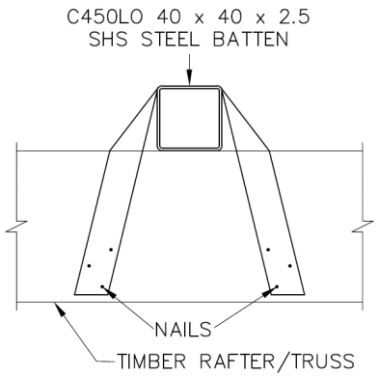
Type 3 – Half Strap – Batten / Purlin to Rafter / Truss Connection Type

For Timber Rafter / Truss Only – minimum J3/JD4 Rafter / Truss
30 x 0.8 G.I. Strap with 3 x Ø 2.8 mm nails per end
Capacity = 4.7 kN

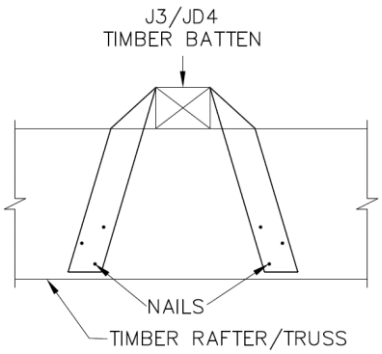
For a **2 x Type 3** Batten to Rafter Connection – Half Strap, position a strap on either side of the Rafter / Truss.



Steel Top Hat Batten



Steel SHS Batten



Timber Batten

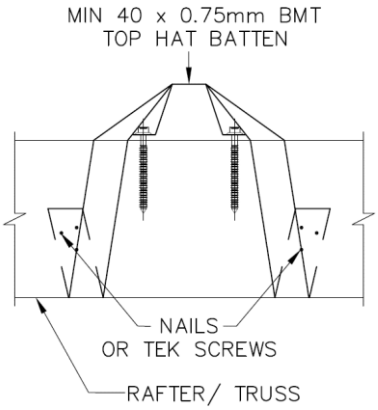
Type 4 – Full Strap – Batten / Purlin to Rafter / Truss Connection Type

30 x 0.8 G.I. Strap to be wrapped around Rafter / Truss with fixings per end as noted below.

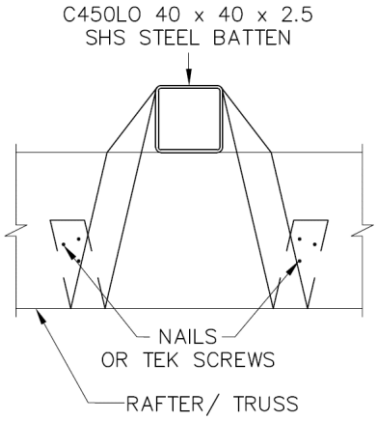
For Timber Rafter / Truss
minimum J3/JD4 Rafter / Truss
with 4 x Ø 2.8 mm nails per end
Capacity = 13 kN

For Steel Rafter / Truss
minimum 1.2 mm BMT G500 Rafter / Truss
with 3 x 12G Teks screws per end
Capacity = 13 kN

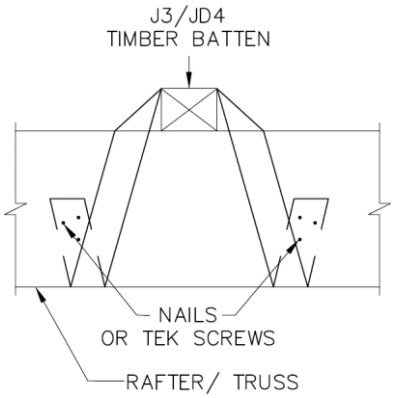
For a **2 x Type 4** Batten to Rafter Connection – Full Strap, position a strap on either side of the Rafter / Truss.



Steel Top Hat Batten



Steel SHS Batten

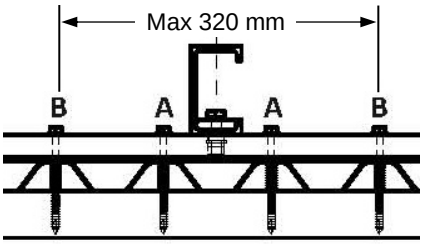


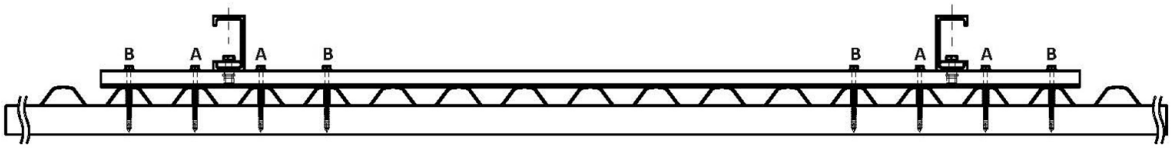
Timber Batten

FASTENERS AND REQUIREMENTS

POSITIONING OF FASTENERS

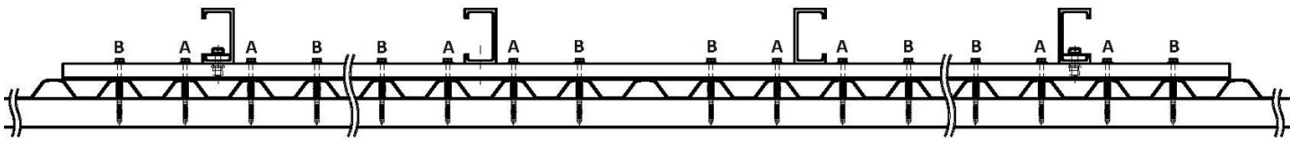
- The Base Plates should be positioned so the fastener holes line up with the higher points of the roof profile. No additional holes are to be added to the Base Plate.
- An equal number of fasteners are to be positioned on either side of each C-Channel.
- Fastener positions ‘A’ are to pass through the crests of the roof cladding using the crests that are as close as possible to the C-Channel.
- Fastener positions ‘B’ (where applicable) are to pass through the crests of the roof cladding using the second closest crests from the C-Channel.
- Where 4 fasteners per Base Plate (one collector frame) or 8 fasteners per Base Plate (two collector frame) are required to be installed, they are to be positioned at positions ‘A’ only or ‘B’ only on either side of a C-Channel.
- Where 8 fasteners per Base Plate (one collector frame) or 16 fasteners per Base Plate (two collector frame) are required to be installed, they are to be positioned at both ’A’ positions and both ‘B’ positions on either side of each C-Channel.
- The distance between fasteners installed at ‘B’ positions on either side of the C-Channel is not to exceed 320 mm.





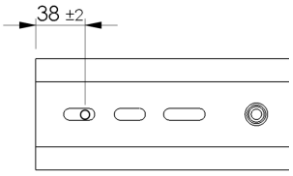
8 FASTENERS TOP BASE PLATE, 8 FASTENERS BOTTOM BASE PLATE
SQUARE CORRUGATED FORM METAL ROOF CLADDING (87.5 mm RIDGE CENTRES) SHOWN

Diagram – Typical A and B fastener positions – 1 collector frame

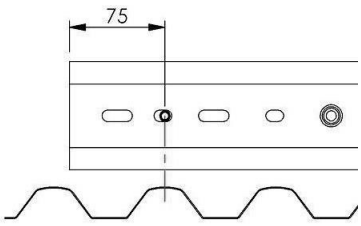


16 FASTENERS TOP BASE PLATE, 16 FASTENERS BOTTOM BASE PLATE
SQUARE CORRUGATED FORM METAL ROOF CLADDING (87.5 mm RIDGE CENTRES) SHOWN

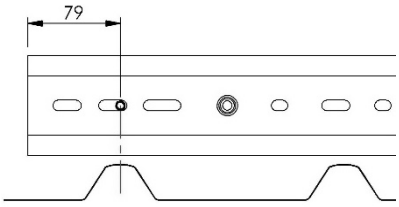
Diagram – Typical A and B fastener positions – 2 collector frame



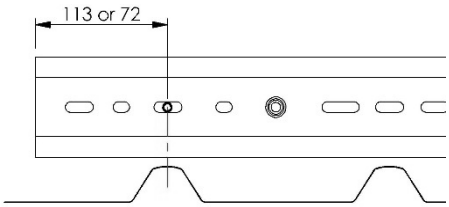
Typical first fastener (B) position
through Base Section (except as otherwise shown)



First fastener position (B) in two collector Base Section
onto Square Corrugate Pitch – 87.5 mm

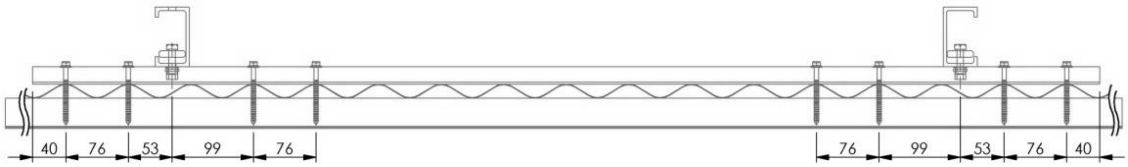


First fastener position in one collector Base Section
onto Square Corrugate Pitch – 190.5 mm

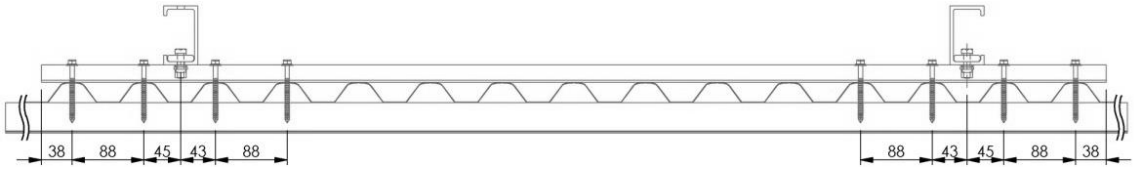


First fastener position in two collector Base Section
onto Square Corrugate Pitch – 190.5 mm

Typical first fastener positions

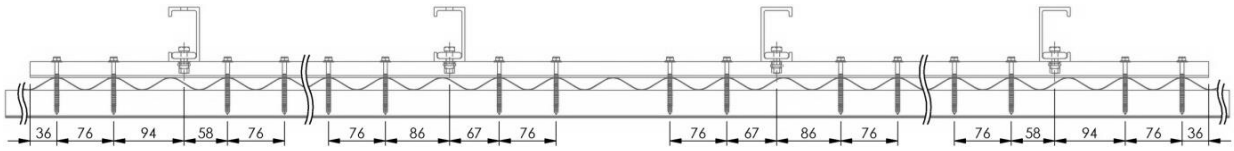


ROUND CORRUGATED FORM METAL ROOF CLADDING (76.2 mm RIDGE CENTRES) – SCREW FIXING AT POSITIONS A & B SHOWN

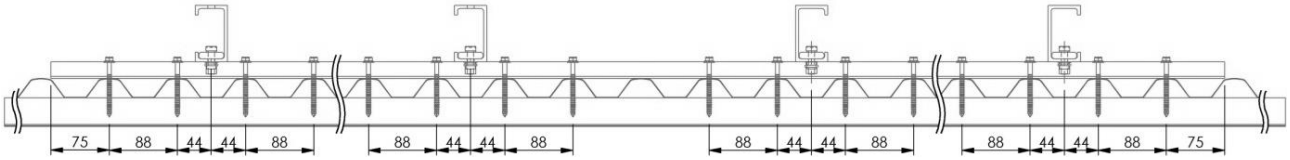


SQUARE CORRUGATED FORM METAL ROOF CLADDING (87.5 mm RIDGE CENTRES) – SCREW FIXING AT POSITIONS A & B SHOWN

one collector frames



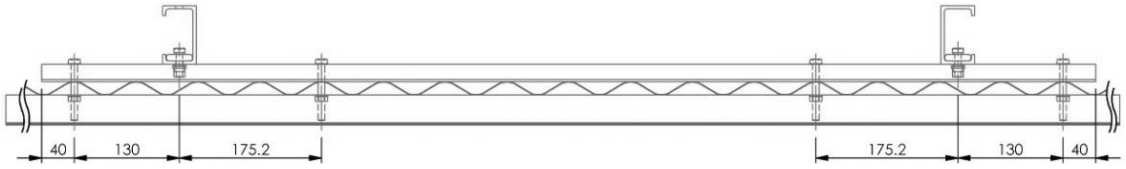
ROUND CORRUGATED FORM METAL ROOF CLADDING (76.2 mm RIDGE CENTRES) – SCREW FIXING AT POSITIONS A & B SHOWN



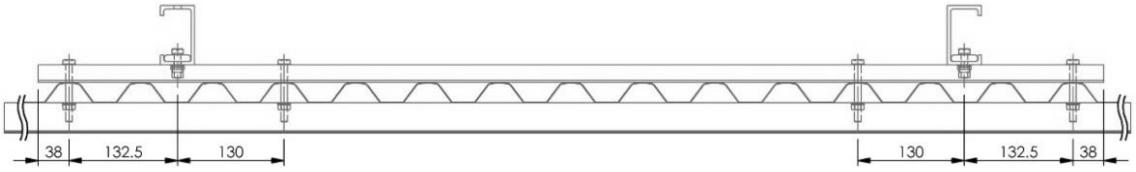
SQUARE CORRUGATED FORM METAL ROOF CLADDING (87.5 mm RIDGE CENTRES) – SCREW FIXING AT POSITIONS A & B SHOWN

two collector frames

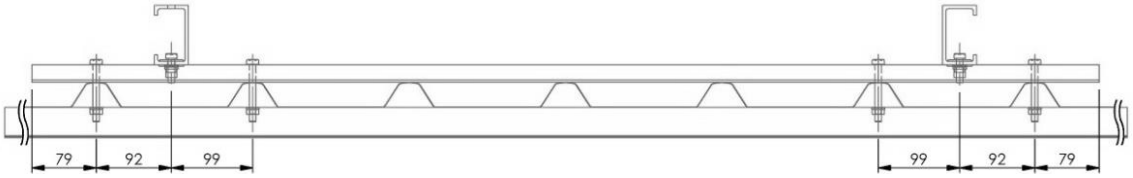
Diagram – examples of typical screw fixing locations



ROUND CORRUGATED FORM METAL ROOF CLADDING (76.2 mm RIDGE CENTRES) – BOLT FIXING AT POSITION B SHOWN

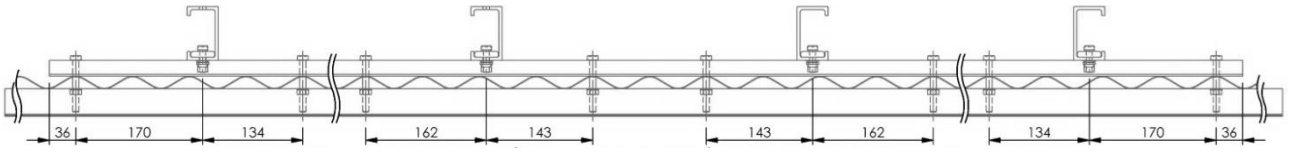


SQUARE CORRUGATED FORM METAL ROOF CLADDING (87.5 mm RIDGE CENTRES) – BOLT FIXING AT POSITION B SHOWN

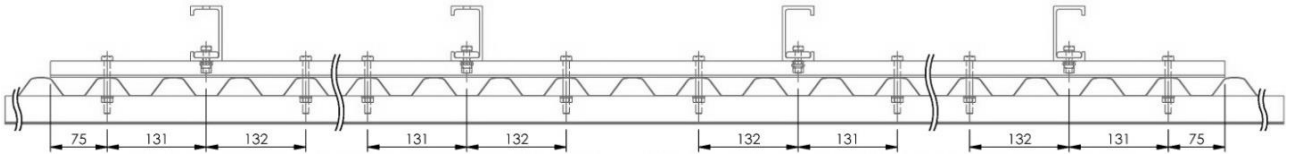


SQUARE CORRUGATED FORM METAL ROOF CLADDING (190.5 mm RIDGE CENTRES) – BOLT FIXING AT POSITION B SHOWN

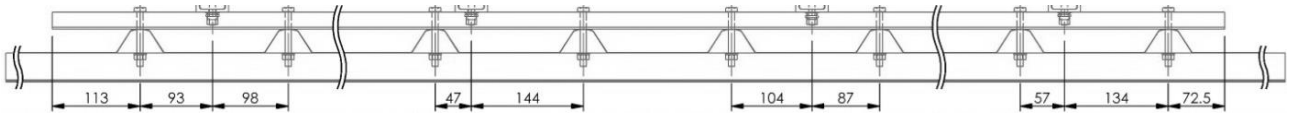
one collector frames



ROUND CORRUGATED FORM METAL ROOF CLADDING (76.2 mm RIDGE CENTRES) – BOLT FIXING AT POSITION B SHOWN



SQUARE CORRUGATED FORM METAL ROOF CLADDING (87.5 mm RIDGE CENTRES) – BOLT FIXING AT POSITION B SHOWN



SQUARE CORRUGATED FORM METAL ROOF CLADDING (190.5 mm RIDGE CENTRES) – BOLT FIXING AT POSITION B SHOWN
(OFFSET CAN BE LEFT OR RIGHT)

two collector frames

Diagram – examples of typical bolt fixing locations

ROOFZIP SCREW FIXING REQUIREMENTS – STEEL BATTEN / PURLIN

Refer to "Steel Batten / Purlin Fixing Options" on page 13 and its following Steel Batten / Purlin Fixings tables to ensure the RoofZip fastener is suitable for the batten type and terrain category.

- The RoofZips shall be an M6.5-12 x 70 mm Hex Head Cyclonic with EPDM Seal (Buildex® No. 6-030-3401-1C4), and compatible with the roof material. The Buildex RoofZip uses a patented thread profile. This RoofZip has a 70 mm nominal and 59.5 mm effective length.
- This RoofZips can only be used through cladding with a profile height not exceeding 30 mm, and is not suitable for use with a profile height exceeding 30 mm. This allows for a minimum penetration through the batten of 12 mm.
- The maximum compressed thickness of any thermal bridging tape or insulating blanket between the underside of the cladding and battens or purlins is to be no greater than 6 mm.
- Fasteners are to be drilled through the first and second crests of the roof cladding on either side of each C-Channel as shown in the Diagram – examples of typical screw fixing locations on page 30. Refer also to "Positioning of Fasteners" on page 29.
- Refer to Detail – RoofZip into Steel Batten on page 33.

METAL TEKS SCREW FIXING REQUIREMENTS – STEEL BATTEN / PURLIN

Refer to "Steel Batten / Purlin Fixing Options" on page 13 and its following Steel Batten / Purlin Fixings tables to ensure the metal Teks screw fastener is suitable for the batten type and terrain category.

- The metal Teks screws shall be a minimum 14G-10TPI stainless steel or equivalent hot dip galvanised, class 4 and compatible with the roof material.
- The metal Teks screws are to be of a suitable length to ensure it has minimum penetration through the steel batten / purlin of 12 mm, considering the depth of the frame base plate (20 mm), the roof cladding profile height and the compressed thickness of any thermal bridging tape or insulating blanket between the underside of the cladding and battens or purlins.
- Fasteners are to be drilled through the first and second crests of the roof cladding on either side of each C-Channel as shown in the Diagram – examples of typical screw fixing locations on page 30. Refer also to "Positioning of Fasteners" on page 29.
- Refer to Detail – Teks Screw into Steel SHS Batten on page 34.

TEKS SCREW FIXING REQUIREMENTS – TIMBER BATTEN / PURLIN

Refer to "Timber Batten / Purlin Fixing Options" on page 18 and its following Timber Batten / Purlin Fixings tables to ensure the Teks screw fastener is suitable for the batten type and terrain category.

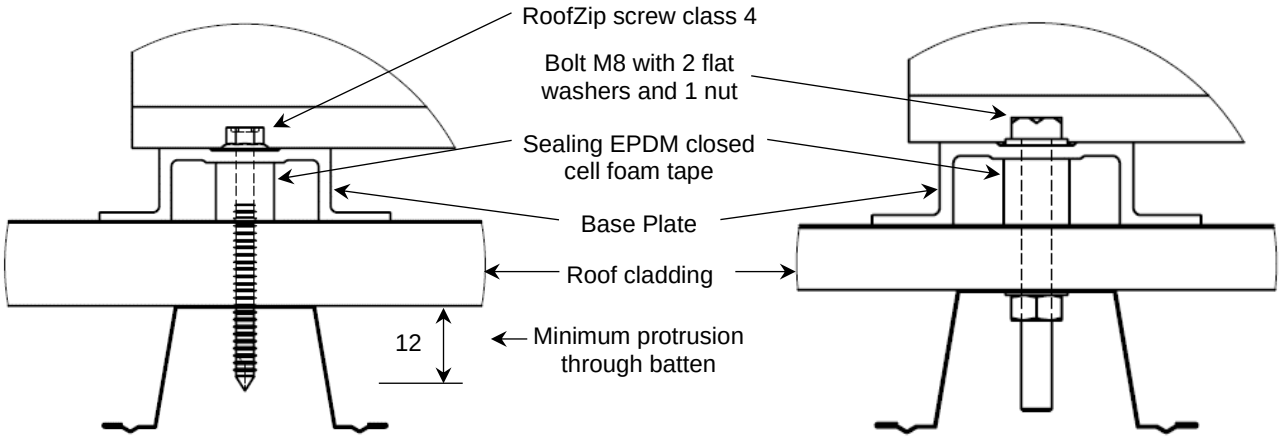
- The Teks screws shall be a minimum No. 14g-10 TPI Hex Washer Type 17 galvanised, class 4, and compatible with the roof material.
- The Teks screws are to be of a suitable length to ensure it has the required minimum embedment into the timber batten / purlin, considering the depth of the frame base plate (20 mm), the roof cladding profile height and the compressed thickness of any thermal bridging tape or insulating blanket between the underside of the cladding and battens or purlins.
- Minimum embedment of Teks screws into timber batten is 25 mm for 38 x 75 mm timber or 35 x 75 mm LVL15, and 35 mm for 45 x 70 mm timber and larger or 46 x 75 mm LVL15.
- Fasteners are to be drilled through the first and second crests of the roof cladding on either side of each C-Channel as shown in the Diagram – examples of typical screw fixing locations on page 30. Refer also to "Positioning of Fasteners" on page 29.
- Refer to Detail – Screw into Timber Batten on page 33.

BOLT FIXING REQUIREMENTS – STEEL OR TIMBER BATTEN / PURLIN

Refer to "Steel Batten / Purlin Fixing Options" on page 13 and to "Timber Batten / Purlin Fixing Options" on page 18 and their following Steel Batten / Purlin Fixings tables to ensure the M8 or 5/16" UNC or BSW Hex bolt fastener is suitable for the batten type and terrain category.

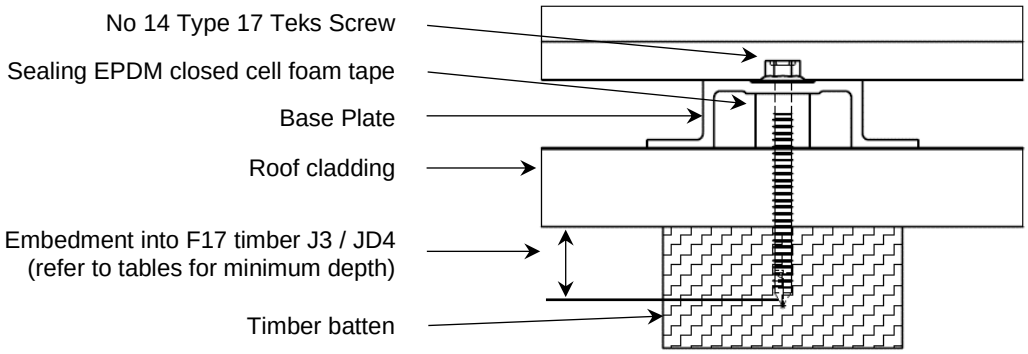
- The bolts shall be M8 or 5/16" UNC or BSW Hex bolts with 2 flat washers of minimum thickness 1.2 mm with one placed under the bold head and the other under the nut.
- All bolts and fixings shall be of stainless steel (A2-70 minimum) or hot dip galvanized (grade 4 minimum), and compatible with the roof material.
- The length of each bolt must enable a minimum 13 mm penetration past the underside of the batten or purlin material for the nut and washer and considering the depth of the frame base plate (20 mm), the roof cladding profile height and the compressed thickness of any thermal bridging tape or insulating blanket between the underside of the cladding and battens or purlins.
- Bolts are to pass through the first and second crests of the roof cladding on either side of each C-Channel. Refer to the Diagram – Typical A and B fastener positions – 2 collector frame on page 29, and the Diagram – examples of typical bolt fixing locations on page 31. Refer also to "Positioning of Fasteners" on page 29.
- Pre-drill each hole though the EPDM foam tape using a Ø6.5 mm – Ø7.5 mm drill bit.
- Refer to Detail – Bolt into Steel Batten on page 33 and Detail – Bolt into Steel SHS Batten on page 34.

FASTENER CONNECTION DETAILS



Detail – RoofZip into Steel Batten

Detail – Bolt into Steel Batten



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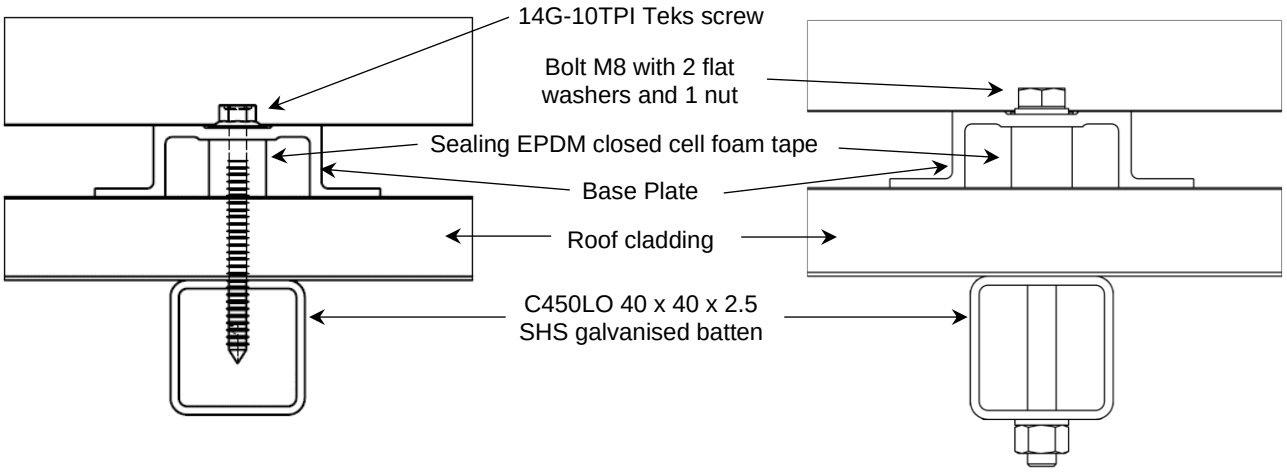
Detail – Screw into Timber Batten



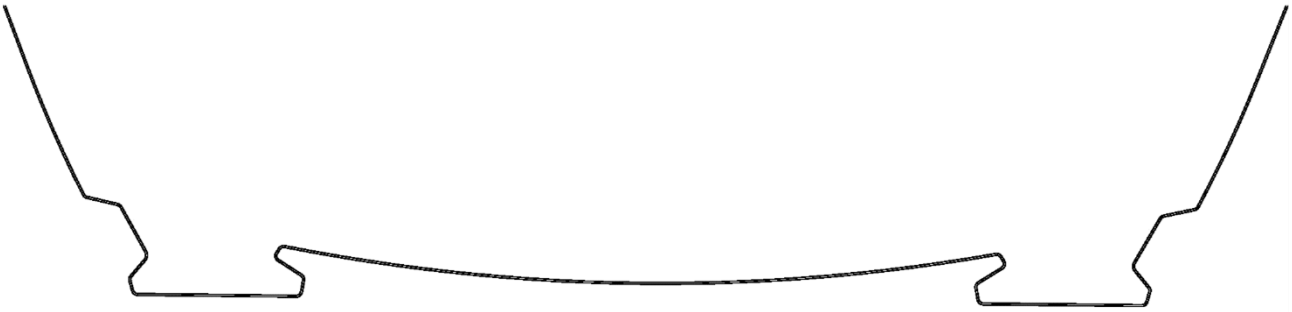
Detail – Teks Screw into Steel SHS Batten

Detail – Bolt into Steel SHS Batten

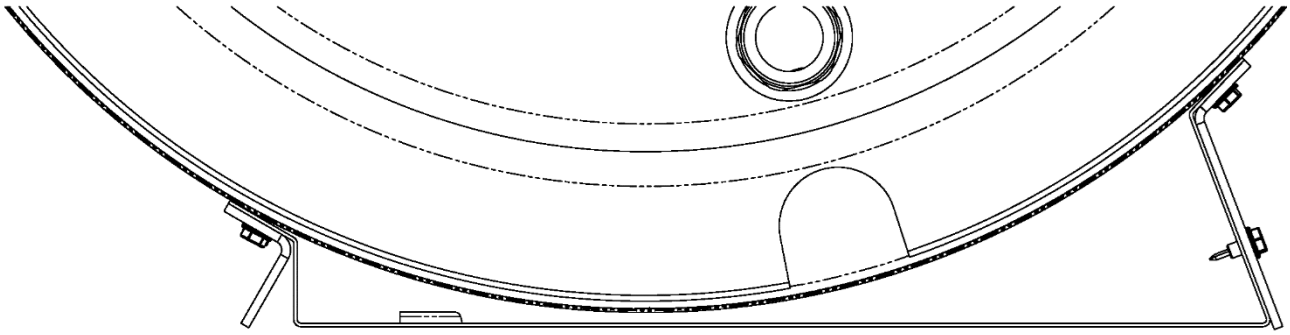
TANK BASE DESIGNS

References are made in these installation instructions relating to the type of tank base and supporting feet design and how it is fixed to the With-Pitch frame. Each design of tank base and feet has its own unique method of connecting to the frame.

The types of tank base design and supporting feet are:



Type 1 – Solar Storage Tank with Two Flat Feet
(Solahart tanks, Rheem Hiline 52C, 52D tanks)



Type 2 – Solar Storage Tank with Flat Base and Reinforcement Plate and Angle
(Rheem 52H and 52L tanks)

ASSEMBLY DIAGRAMS

SOLAR STORAGE TANK WITH ONE COLLECTOR – FRAME ASSEMBLY

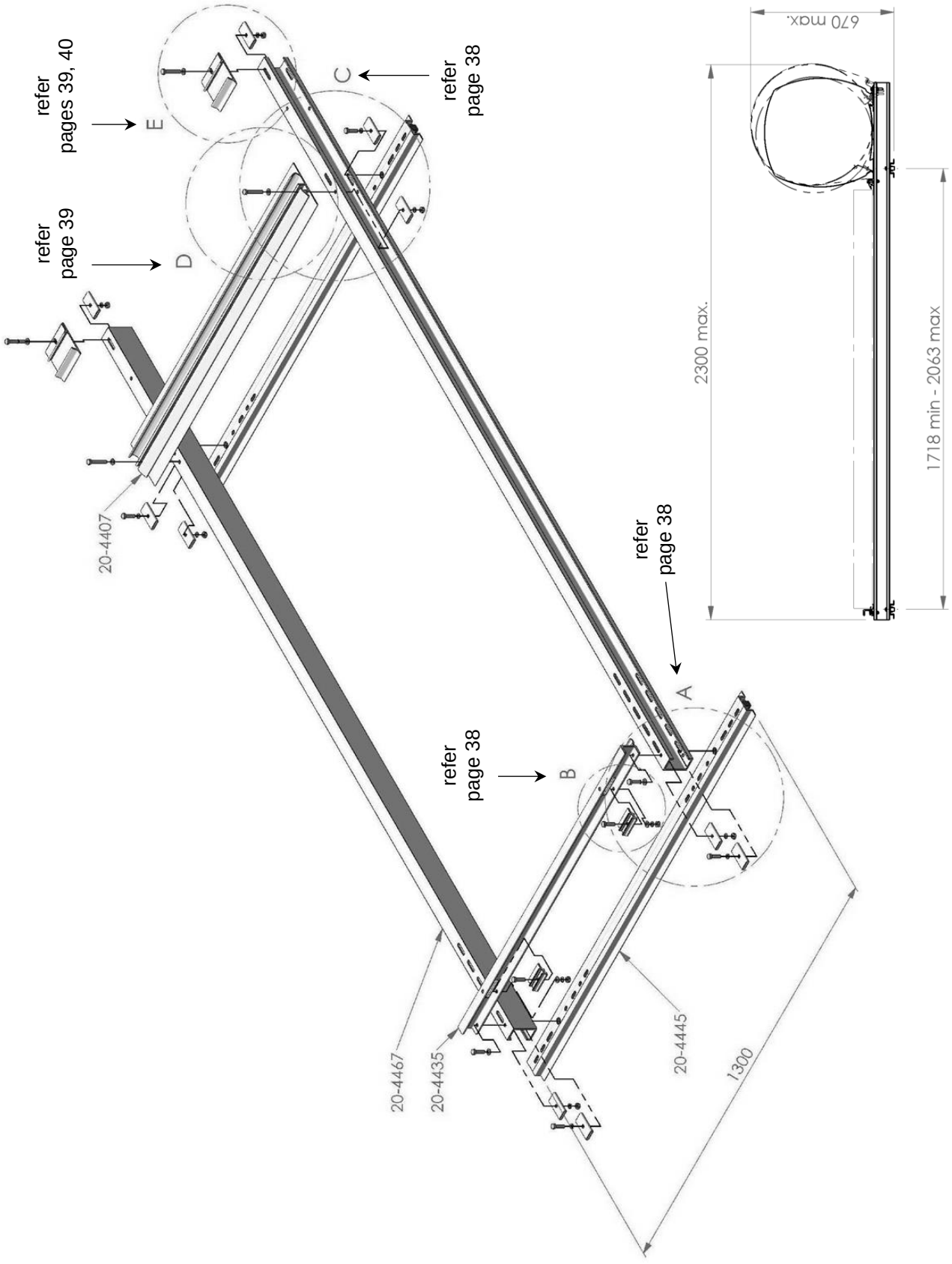


Diagram 1
1 x 204010 – With-Pitch Frame Thermosiphon with 1 x 2.0m^2 Collector – 180 Tanks
(assembly drawing shows Envelope collector and type 1 tank mounting options)

SOLAR STORAGE TANK WITH TWO COLLECTORS – FRAME ASSEMBLY

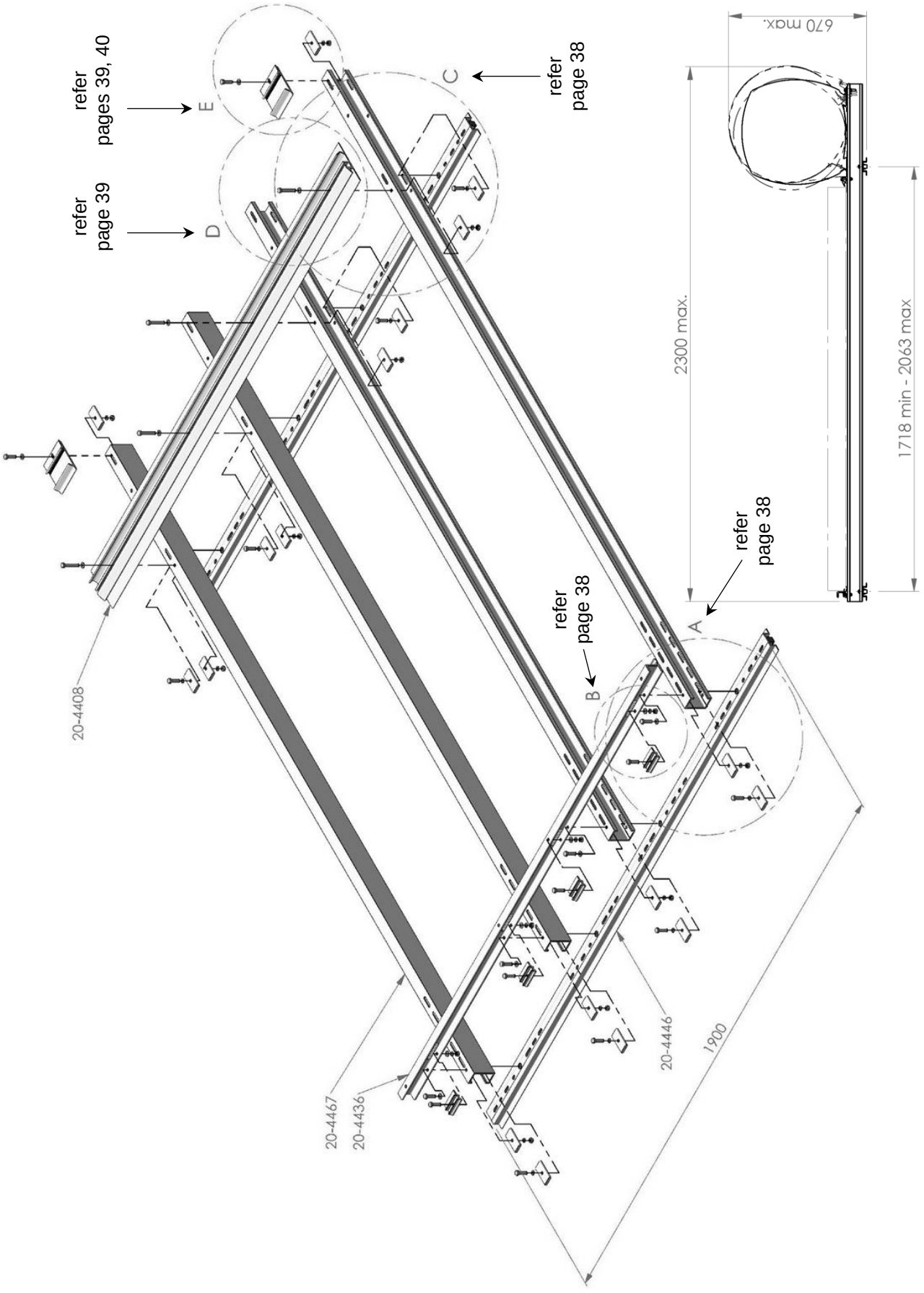
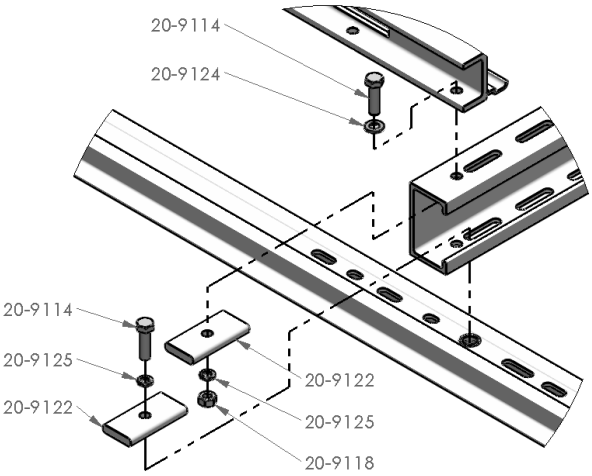
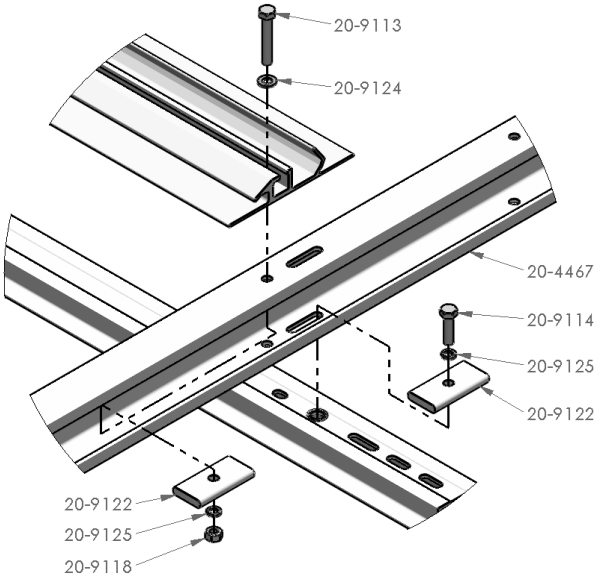


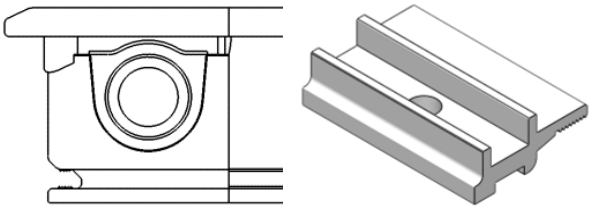
Diagram 2
1 x 204011 – With-Pitch Frame Thermosiphon with 2 x 2.0m² Collectors – 300 Tanks
(assembly drawing shows Envelope collector and type 1 tank mounting options)



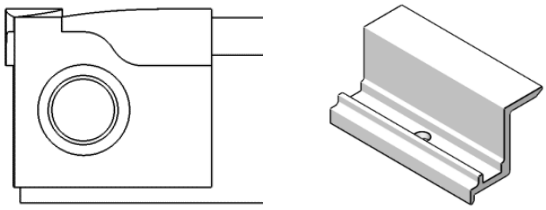
Detail A
Collector Rail, C-Channel,
Lower Base Plate Connections



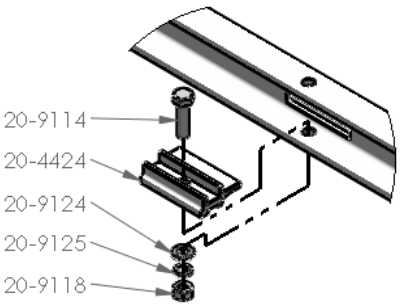
Detail C
Tank / Collector Rail, C-Channel,
Upper Base Plate Connections



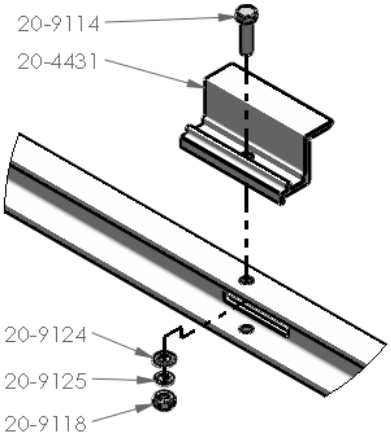
Envelope profile and Collector Clamp – 204424
Collector Rail location



folded-tray profile and Collector Clamp – 204431
Collector Rail location

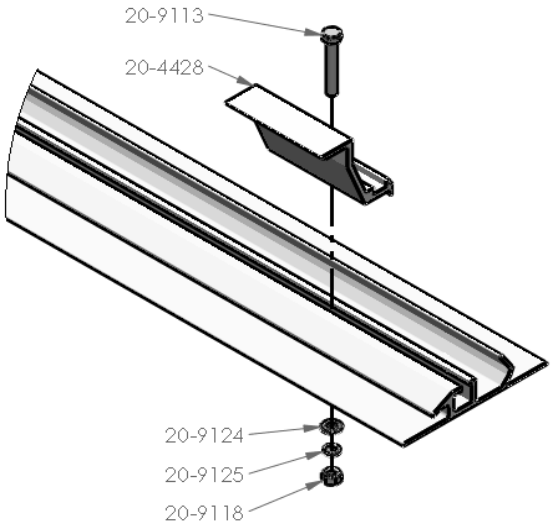


Envelope collector type

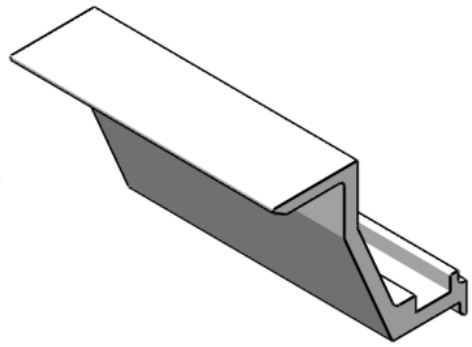


folded-tray collector type

Detail B
Collector Clamping – Collector Rail

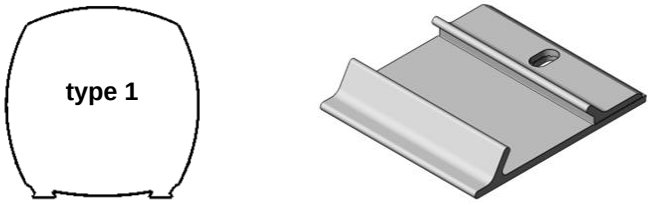


Tank / Collector Rail location

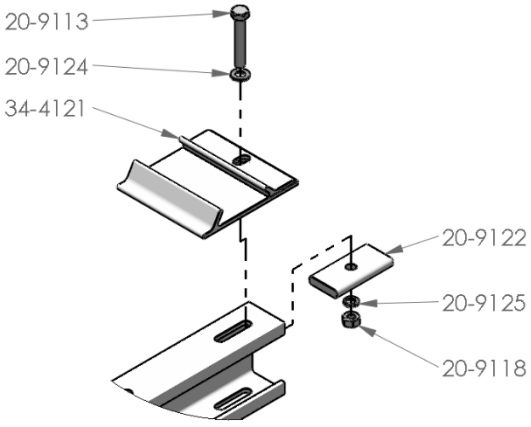


folded-tray Collector Clamp – 204428

Detail D
Collector Clamping Folded-tray Type – Tank / Collector Rail

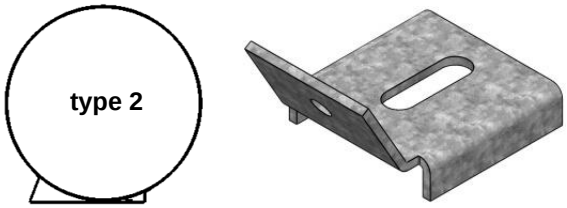


type 1 tank and Tank Clamp – 344121

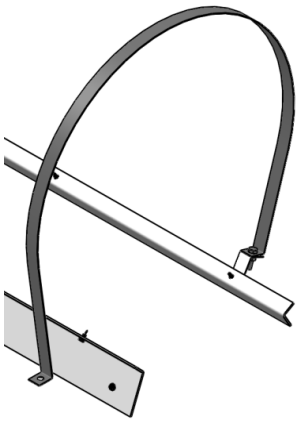


type 1 tank mounting
solar storage tank with two flat feet

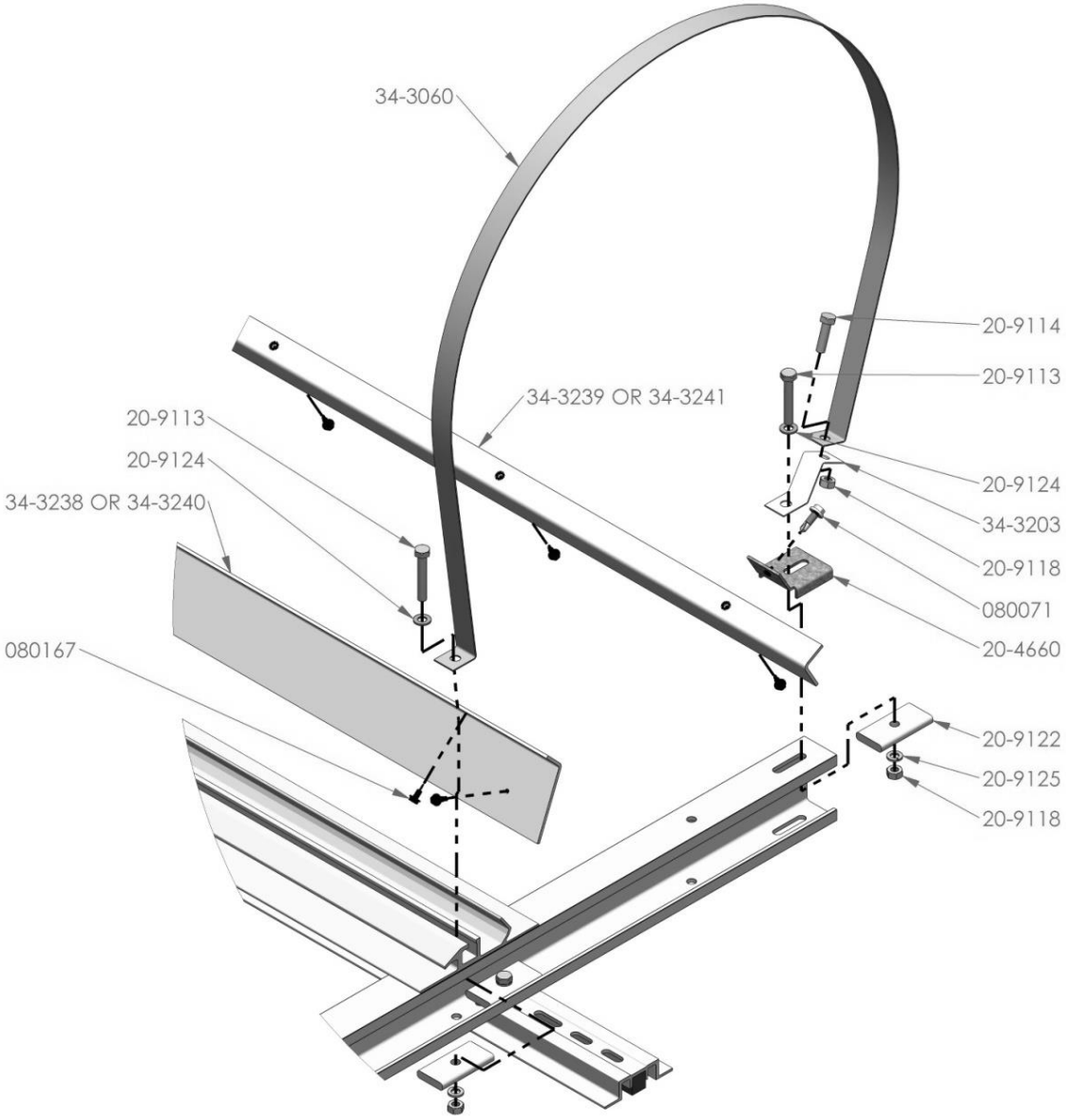
Detail E
Tank Mounting – Type 1 Tank



type 2 tank and Tank Clamp – 204660



Reinforcement Plate / Angle and Tank Straps
frame mounting kits – 12103998, 12103999



type 2 tank mounting
solar storage tank with flat base and Reinforcement Plate / Angle

Detail E
Tank Mounting – Type 2 Tank

CHECK LIST

It is recommended to complete the part 1 of the check list prior to the assembly and installation of the frame on the roof and the part 2 of the check list once the installation has been completed.

Part 1 – Frame suitability for the installation

[ ] Determine the wind region, terrain category and wind class.
It may be necessary to confirm the terrain category and wind class with the local council.

[ ] Determine the location of the frame on the roof, average roof height, and h/d, h/b.

[ ] Determine the suitability of the roof cladding and existing battens.

[ ] Determine whether additional battens are required.

[ ] Determine the type and number of fasteners required.

Part 2 – Frame installation

[ ] Installation of battens if required.

[ ] Location of the frame in correct position on roof allowing for correct set-backs.

[ ] Tightening of the screws into nutserts securing C-Channels to Base Plates.

[ ] Fixing of the Base Plate / C-Channel assembly to battens with correct fasteners.

[ ] Tightening of the screws and nuts securing Collector Rail and Tank / Collector Rail to the C-Channels.

[ ] Installation and correct positioning of solar collectors.

[ ] Engagement of Envelope type collector into the retention feature of Tank / Collector Rail.

[ ] Installation and correct positioning of the solar storage tank.

[ ] Installation and tightening of the solar pipe work.

[ ] Installation of the tank straps (type 2 tank only – 52H, 52L models).

[ ] Selection and installation of the correct Tank Clamps.

[ ] Tightening of the screws and nuts on Tank Clamps.

[ ] Installation of the Collector Clamps to Tank / Collector Rail (folded-tray collectors only).

[ ] Tightening of the screws and nuts on Collector Clamps to Tank / Collector Rail.

[ ] Installation of the Collector Clamps to Collector Rail.

[ ] Tightening of the screws and nuts on Collector Clamps to Collector Rail.

ON ROOF MOUNTING

The “On Roof Mounting” method is **not** suitable for tile, slate, shingle and similar roof types.

Before commencing assembly:

- Complete Part 1 – Frame suitability for the installation of the Check List on page 41.
- Confirm the correct parts kit boxes are available to construct the frame for the thermosiphon solar water heater being installed (refer to “Solar Water Heater Systems” on page 9).

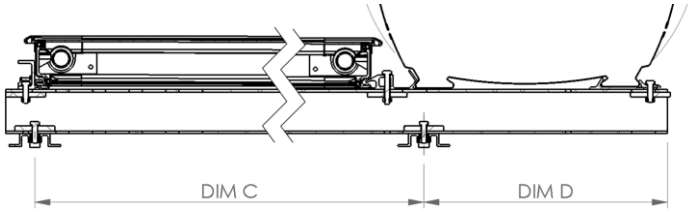
Notes

- The roof cladding area where the Base Plates of the frame are to be installed must be even so the Base Plates sit flat and evenly on the roof cladding profile. This is to enable correct penetration length of all fixings through the Base Plates into the battens / purlins.
- Penetrations through the roofing material must be:
  - made neatly and kept as small as practicable;
  - waterproofed upon installation of the RoofZips, Teks screws or bolts.
- Care should be taken not to mark Colorbond or other metal roof sheet with a marking pen and to remove all swarf from the metal roof as these can cause deterioration of the metal roofing material.

ESTABLISH LOCATION OF THE FRAME

Determine the position on the roof where the frame and solar water heater are to be installed.

- The frame is required to be fixed to two roof battens / purlins. Refer to “Steel Batten / Purlin Fixing Options” commencing on page 13 and “Timber Batten / Purlin Fixing Options” commencing on page 18 for the types of battens / purlins which may be used.
  - The centre to centre distance apart of the two roof battens / purlins, to which the Base Plates are secured, must be from 1718 mm to 2063 mm. The most common dimension between the two suitable purlins is 1800 mm, which suits 450 mm, 600 mm or 900 mm batten / purlin spacings.
  - The available distances between the Base Plates is determined by the holes and slots in the C-Channels. Refer to diagram C-Channel to Base Plate Connection Positions on page 42. The centre to centre distance between the Base Plates must be equal to the centre to centre distance between the selected battens / purlins. It will be necessary to measure this distance.
  - The roof battens / purlins must be continuous over not less than three rafters or trusses for both one and two collector frames.
  - The roof battens / purlins must be securely fixed to each rafter or truss. Refer to “Batten To Rafter Fixing Options” on page 23.
- If one or two new battens / purlins are required, select the position of and install the battens / purlins to which the With-Pitch frame is to be fixed.
- Refer to “Anywhere Within Inclusion Zone and Rafter Centre Offset Installations” on page 6.



C-Channel to Base Section Connection		
DIM D	**DIM C**	
460	1718 min	2003 max
399-429	1748 min	2063 max

bottom (collector) end –
to be installed down toward roof gutter

top (tank) end –
to be installed up toward roof ridge

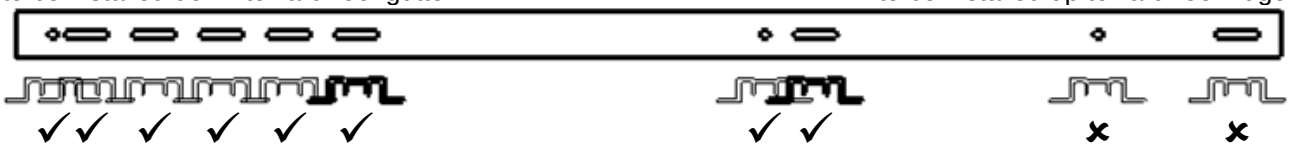


Diagram – C-Channel to Base Plate Connection Positions

ASSEMBLY OF THE FRAME C-CHANNELS AND BASE PLATES

Refer to the assembly diagrams;

- solar storage tank with 1 x 2.0m^2 Collector – 180 Tanks – Diagram 1 on page 36.
- solar storage tank with 2 x 2.0m^2 Collector – 300 Tanks – Diagram 2 on page 37.
- detail drawings A, B, C on page 38, D on page 39, and E on pages 39 and 40.

C-Channels

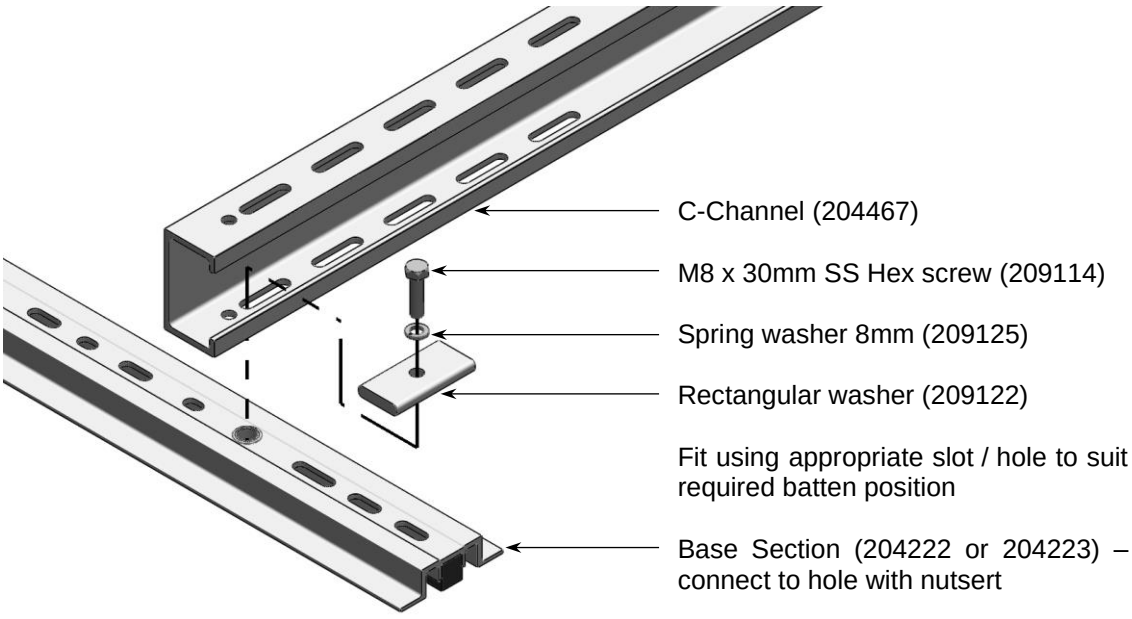
- There is one round hole and a single slot provided at one end of each C-Channel. This is the top end of the C-Channel, is to be installed up toward the ridge of the roof and is the end which will support the solar storage tank.
- There is one round hole and five slots provided at the other end of the C-Channel. This is the bottom end of the C-Channel, is to be installed down toward the roof gutter and is the end which will support the solar collector(s).

Base Plates

- There are round holes with a nutsert in each Base Plate. These holes are used for connecting the C-Channels to the Base Plate.
- There are round holes and slots (without nutserts) in each Base Plate. These holes and slots are fastener holes to be used to connect the Base Plate through the roof cladding to the roof batten / purlin.

Assembly

- Loosely fit the Base Plates and the C-Channels together, using screws and washers provided, fixing a screw into each nutsert in the Base Plates.
  - Use one M8 x 30 mm Hex screw (209114) per connection, with one spring washer (8 x 14.3 x 2 mm SS – 209125) directly under the screw head and one rectangular washer (65 x 32 x 8 mm - 209122) between the spring washer and the C-Channel.
  - *Top end of C-Channel:* Use either the hole or slot provided at 460 mm or 415 mm from the top end of the C-Channel to connect to the upper Base Plate.
  - *Bottom end of C-Channel:* Use the hole or one of the five slots provided at the bottom end of the C-Channel to connect to the lower Base Plate.
  - Select the holes or slots in the C-Channels that provide the correct batten to batten centre distance to secure the Base Plates. Refer to diagram Channel to Base Plate Connection Positions on page 42.

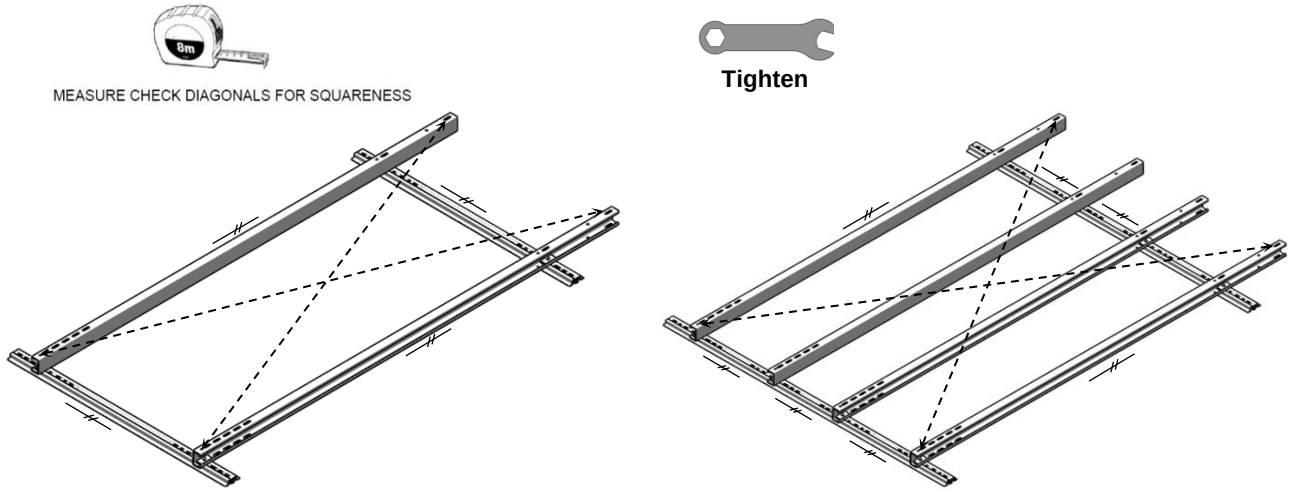


C-Channel to Base Plate connection (bottom end shown)

- Square up the frame by making sure the diagonals between the outside C-Channels are equidistant and ensure the centre to centre distance between the Base Plates is equal to the centre to centre distance between the two roof battens / purlins.

  The diagonals must be equidistant, otherwise the solar collectors will not fit onto the frame.

  - Tighten the screws in the nutserts, using a spanner.



one collector thermosiphon frame **two collector thermosiphon frame**

square up frame and check distances

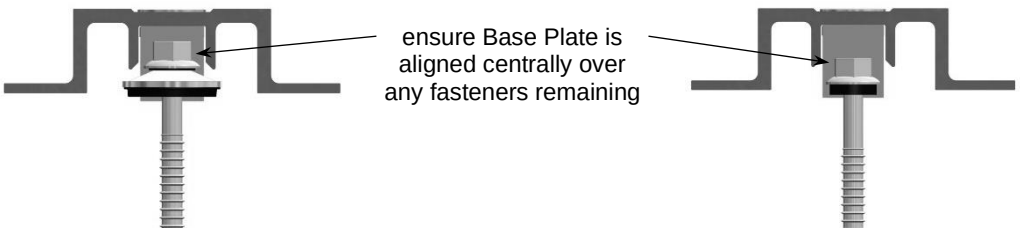
SECURING THE BASE PLATES / FRAME C-CHANNELS ASSEMBLY TO ROOF

During the positioning and securing of the assembled frame base to the roof, ensure:

- the Base Plates are located over the two roof battens / purlins,
- the two outside C-Channels are as close as possible to adjacent rafters,
- the fastener holes in the Base Plates are located over the crests of the roof cladding profile,
- the EPDM rubber foam tape when compressed will accommodate existing roof cladding fasteners,

  Note

  - if existing roof cladding fasteners cannot be accommodated by the EPDM rubber because their profile is too high, then these fasteners must be replaced with lower profile fasteners approved for the roof sheet fixing application, particularly in Wind Regions C and D.
  - If the line of existing roof cladding fasteners which will be covered by the Base Plate is not within ± 5 mm of a straight line, then an existing fastener may need to be removed and relocated to fit under the EPDM rubber strip and the positioning webs within the Base Plate. Any penetration of the roof cladding from the removal of a fastener must be weatherproofed.



When selecting the locations where the RoofZips, Teks screws or bolts are to penetrate the roof material:

- Use the slots in the Base Plate that match the crests of the roof cladding profile to enable penetrations to be made through the crest of the profile.

  Refer to the tables;

  - “Steel Batten / Purlin Fixing Options” on page 13 and
  - “Timber Batten / Purlin Fixing Options” on page 18,

  and to;

  - “Positioning Of Fasteners” on page 29, and
  - “RoofZip Screw Fixing Requirements – Steel Batten / Purlin” on page 32, and
  - “Metal Teks Screw Fixing Requirements – Steel Batten / Purlin” on page 32, and
  - “Teks Screw Fixing Requirements – Timber Batten / Purlin” on page 32, and
  - “Bolt Fixing Requirements – Steel or Timber Batten / Purlin” on page 33

  for the types of fasteners which can be used for each batten type, and for the number and correct location of the fixing points in the Base Plates, and for typical connection details.

  Note: If fastening with bolts then pre-drill holes through EPDM foam tape in the base section using a Ø6.5mm – Ø7.5mm drill bit.

Position and secure the assembled frame base to the roof:

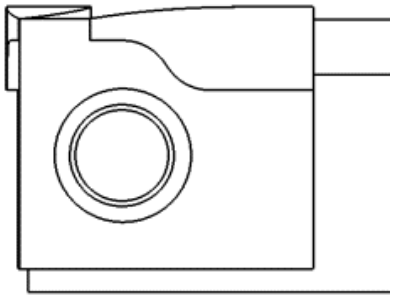
- Remove the existing roofing fasteners which will be replaced by the screws or bolts used to secure the Base Plates.
- Replace and / or relocate remaining fasteners if required to enable the Base Plates to sit flat on the roof.
- Position the assembled frame base on the roof over the area where it is to be installed.
- Secure one Base Plate to the batten / purlin.
  - When fastening the Base Plate to the roof, use the appropriate outside slot on each end first to locate and line up the frame such that all other slots are correctly positioned relative to the roof cladding profile.
- Recheck the squareness of the frame by remeasuring the diagonals between the outside C-Channels ensuring they are equidistant. If necessary square up the frame base prior to securing the second Base Plate.
- Secure the second Base Plate to the batten / purlin.

INSTALLATION OF RAILS

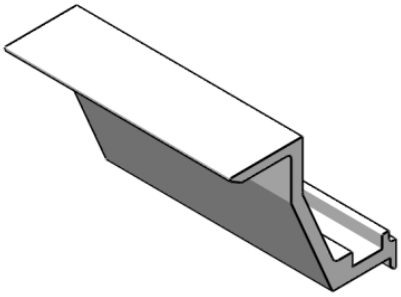
INSTALLING THE TANK / COLLECTOR RAIL TO C-CHANNELS

Fitting Collector Clamps to Tank / Collector Rail (Folded-Tray Collector only)

When installing a system with collectors of a folded-tray design, the Collector Clamps can be fitted to the Tank / Collector Rail prior to or after fitting the Tank / Collector Rail to the C-Channels. However they should be fitted prior to the placing of the solar storage tank on the frame, as access to the nut may be difficult after the tank has been installed.

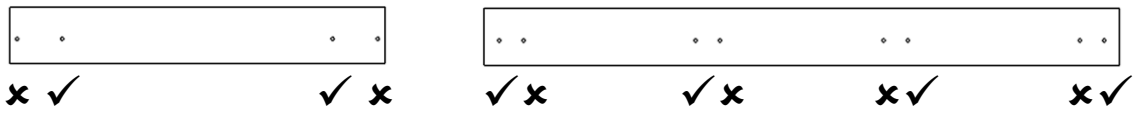


folded-tray collector profile



Collector Clamp 204428 – Tank / Collector Rail

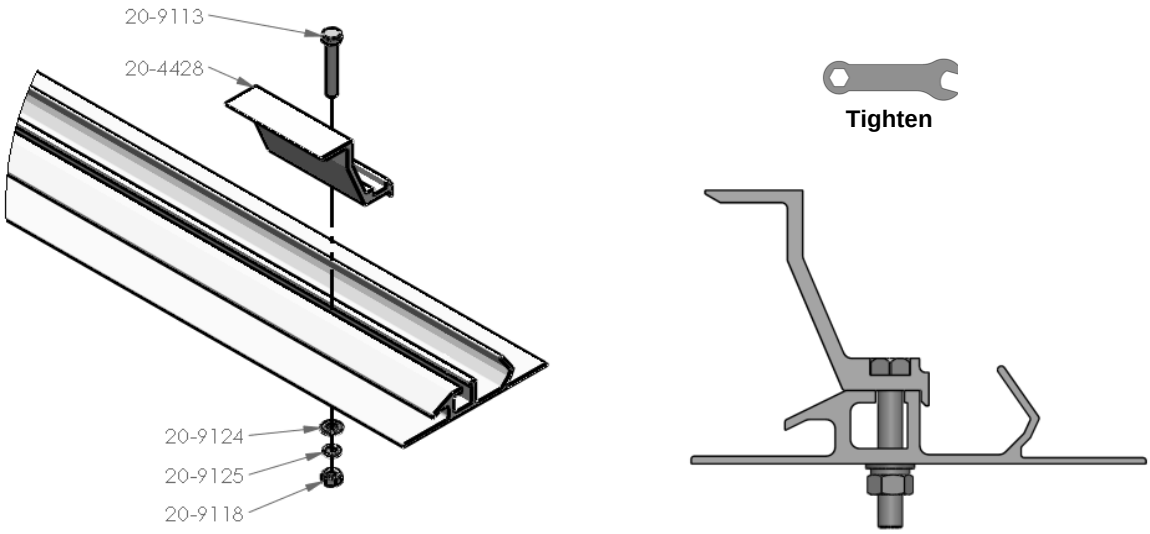
- Fit the Collector Clamps (204428 - two per solar collector) to the Tank / Collector Rail.
  - Take care to use the correct holes in the Tank / Collector Rail to fit the Collector Clamps, as shown in the diagram "Collector Clamp bolt holes (underside view of Tank / Collector Rails)".
  - Use a 50 mm screw (209113 - Set screw Hex M8 x 50 mm SS 304), an 8 mm round washer ((209124 - Washer flat 8 mm (G304)) located under the Tank / Collector Rail, and a 8 mm ID spring washer (209125 - Washer spring 8 x 14.3 x 2 mm (G304)) under the nut (209118 - Nut M8 x 1.25 mm (G304)).
  - Tighten the nuts and screws.



one collector Tank / Collector Rail

two collector Tank / Collector Rail

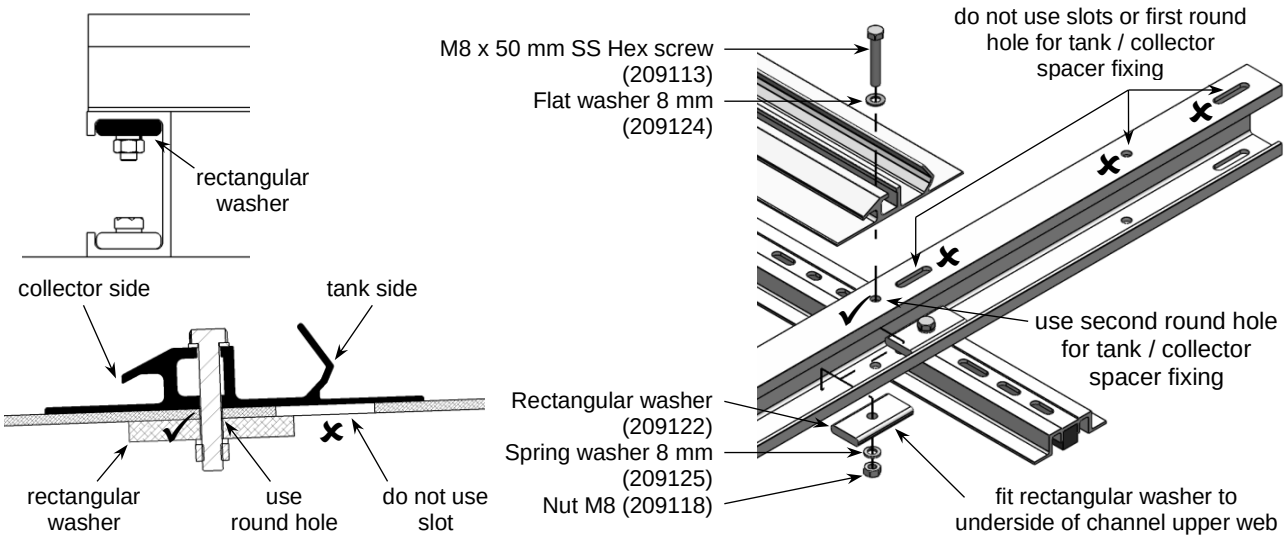
Collector Clamp bolt holes (underside view of Tank / Collector Rails)



fitting folded-tray Collector Clamps to Tank / Collector Rail

Fitting Tank / Collector Rail to C-Channels

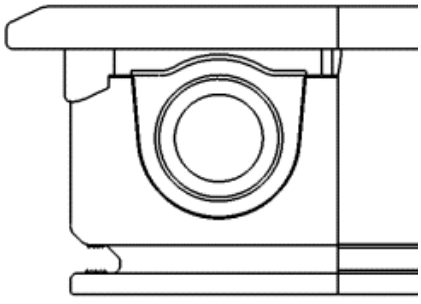
- Position the Tank / Collector Rail on the C-Channels to line up with the second round hole, approximately 460 mm from top end of the C-Channels.
- Fix the Tank / Collector Rail to each of the C-Channels using:
  - one 50 mm screw (209113 - set screw hex M8 x 50 mm SS 304)
  - one 8 mm round washer (209124 - washer flat 8 mm (G304)) located under the screw head.
  - one rectangular washer (209122 - washer rectangular 65 x 32 x 8 mm – aluminium) located under the C-Channel upper web.
  - one 8 mm ID spring washer (209125 - washer spring 8 x 14.3 x 2 mm (G304)) under the nut (209118 - nut M8 x 1.25 mm (G304)).
- Tighten the nuts and screws, using a spanner.



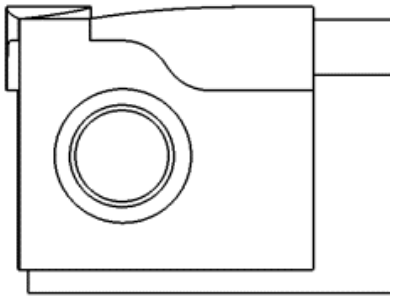
fixing Tank / Collector Rail to C-Channels

INSTALLING THE COLLECTOR RAIL TO C-CHANNELS

- Position the Collector Rail on the C-Channels to line up with the;
  - **Envelope type collector** – round hole approximately 33 mm from at the bottom end of the C-Channels.
  - **Folded-tray type collector** – first slot approximately 48 mm from the bottom end of the C-Channels.

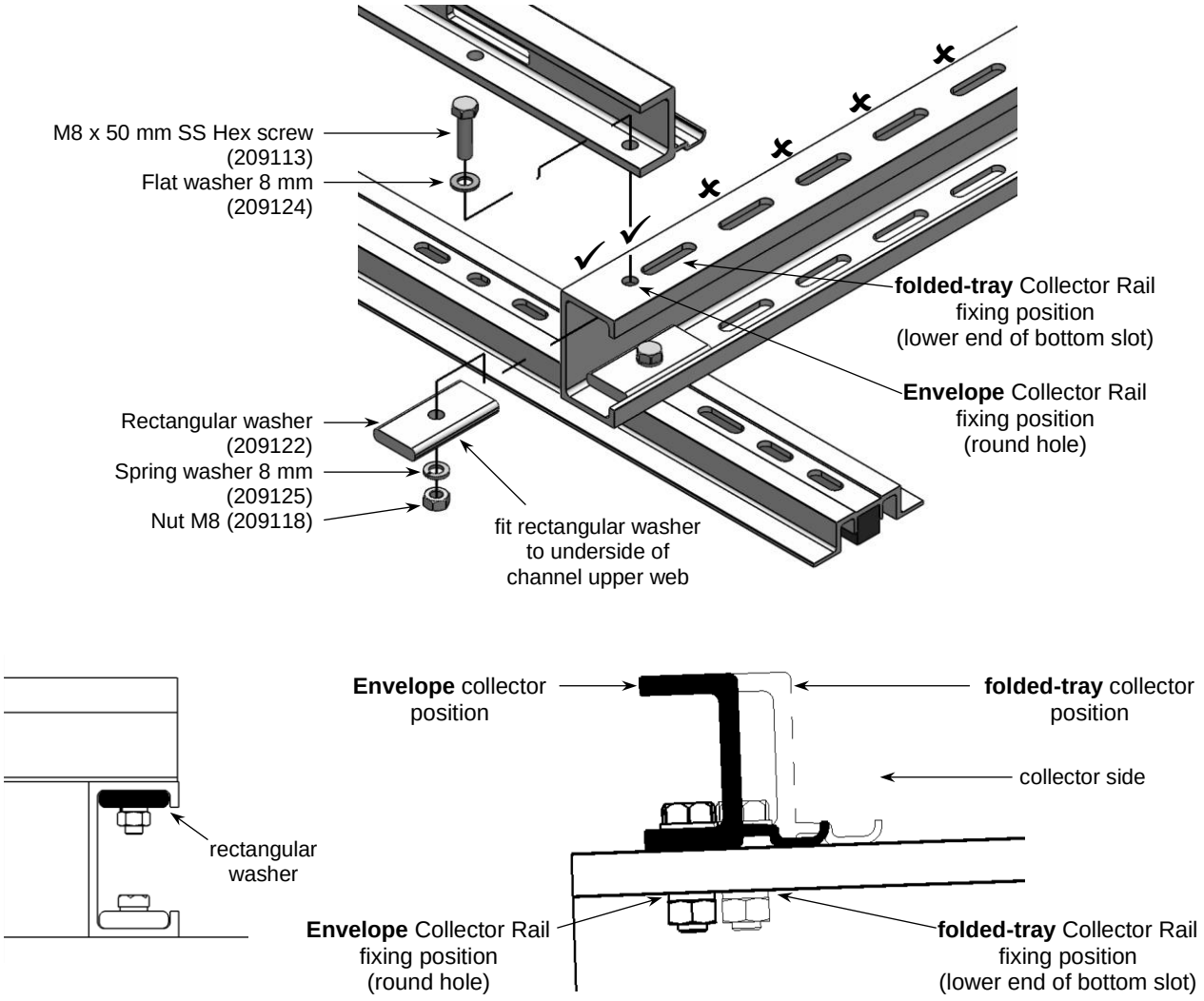


Envelope collector profile



folded-tray collector profile

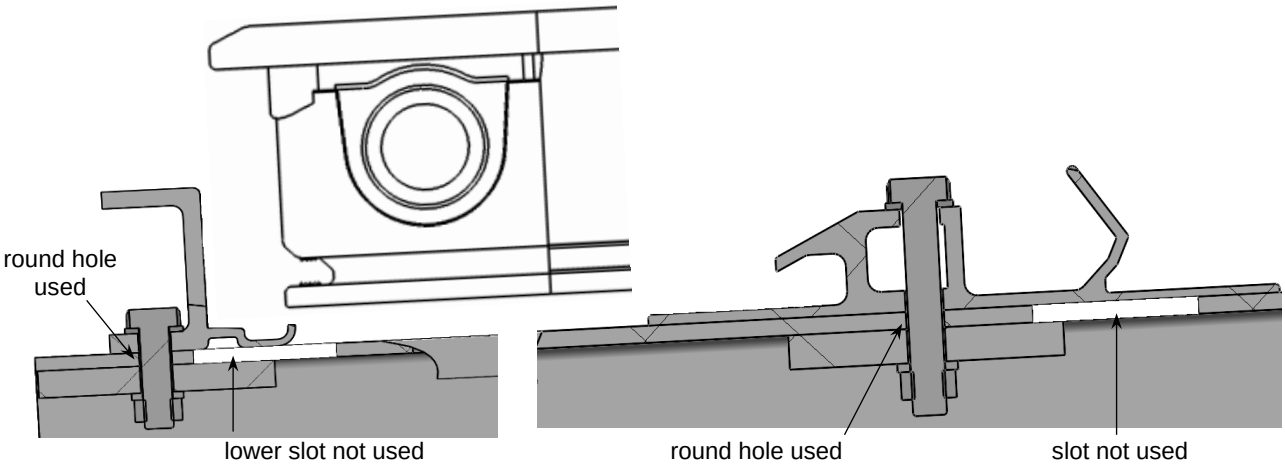
- Fix the Collector Rail to each of the C-Channels using:
  - one 50 mm screw (209113 - set screw hex M8 x 50 mm SS 304)
  - one 8 mm round washer (209124 - washer flat 8 mm (G304)) located under the screw head.
  - one rectangular washer (209122 - washer rectangular 65 x 32 x 8 mm – aluminium) located under the C-Channel upper web.
  - one 8 mm ID spring washer (209125 - washer spring 8 x 14.3 x 2 mm (G304)) under the nut (209118 - nut M8 x 1.25 mm (G304)).
- Tighten the nuts and screws, using a spanner.



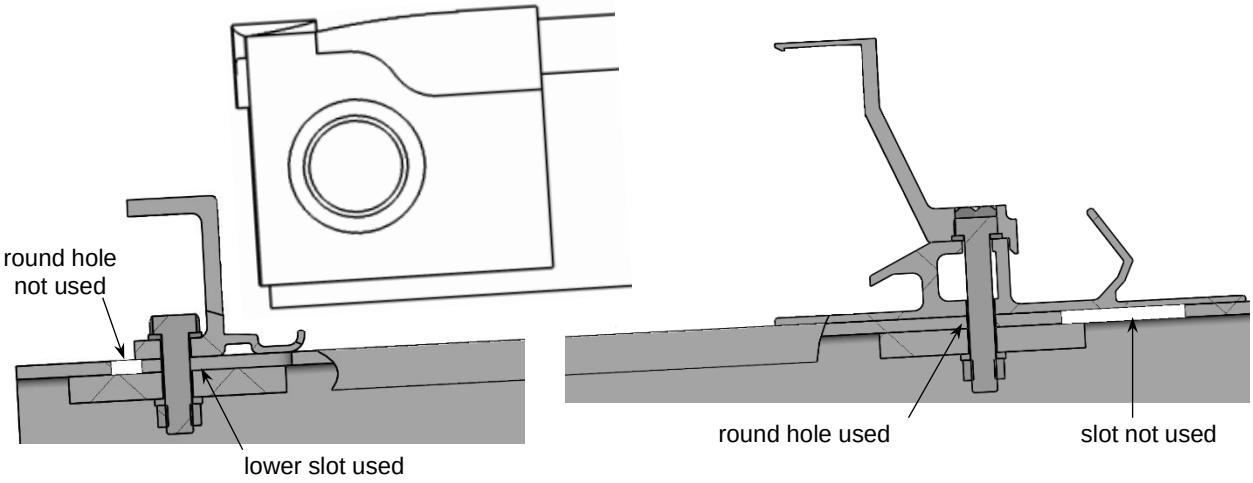
fixing Collector Rail to C-Channels

INSTALLING THE SOLAR COLLECTORS

Confirm the correct position of the Collector Rail and Tank / Collector Rail for the collector type to be installed.



Envelope collector profile



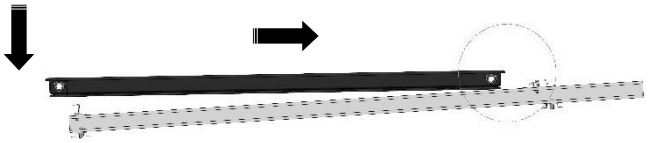
folded-tray collector profile

INSTALLING THE FIRST COLLECTOR

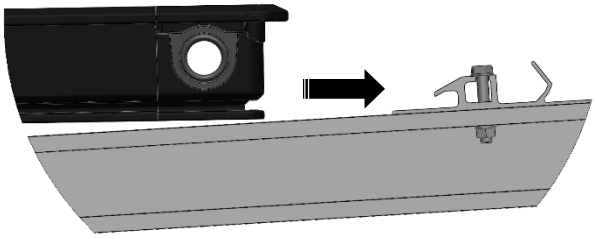
- Position the top end of the first solar collector into the Tank / Collector Rail and the bottom end of the solar collector onto the bottom Collector Rail.
  - With the base of the upper end of the collector resting on the C-Channels, slide the collector upwards along the C-Channels until it is engaged with the Tank / Collector Rail.
    - **Envelope collector** – the bottom lip of the collector must fully engage under the retention feature of the Tank / Collector Rail.

      ⚠ **Warning:** the bottom lip of the collector **must not** sit on top of the retention feature of the Tank / Collector Rail.
    - **Folded-tray collector** – the upper end of the collector must be against the retention feature of the Tank / Collector Rail and fully engage under the Collector Clamps
  - Lower the bottom end of the solar collector carefully onto the foot of the Collector Rail. The bottom end must be against the face of the Collector Rail.
- Take care not to scratch or damage the external surface of the solar collector when positioning onto the Tank / Collector Rail and Collector Rail.
- Refer to diagrams under "Positioning an Envelope Collector" on page 50 and "Positioning a Folded-Tray Collector" on page 51.

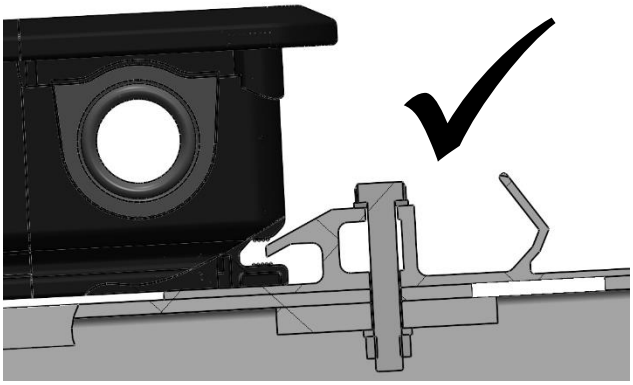
Positioning an Envelope Collector



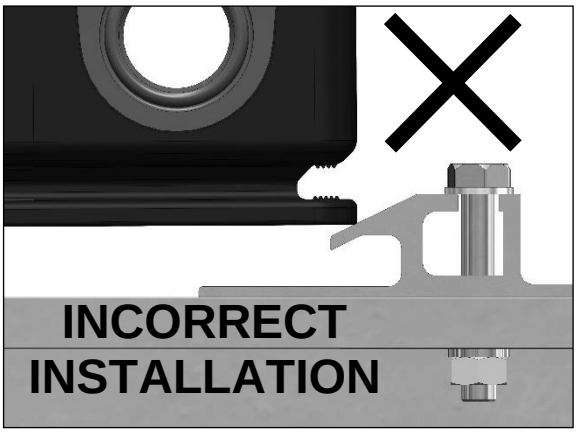
slide collector upwards along C-Channels



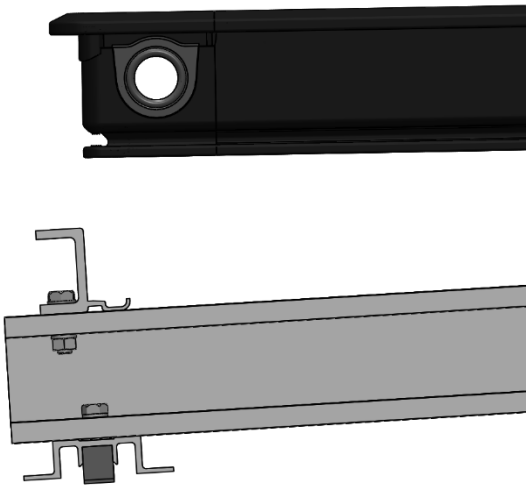
slide collector up to engage into Tank / Collector Rail



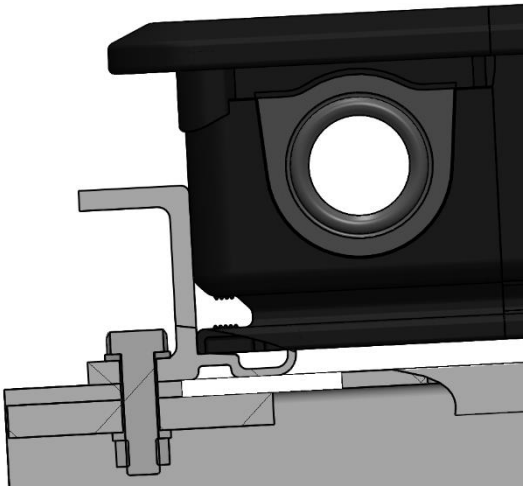
bottom lip **must fully engage**
under the retention feature of Tank / Collector Rail



bottom lip **must not** sit
on top of the retention feature

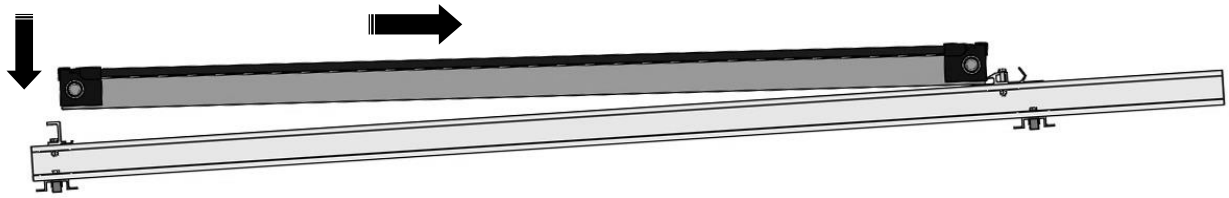


lower bottom end carefully
onto the foot of the Collector Rail

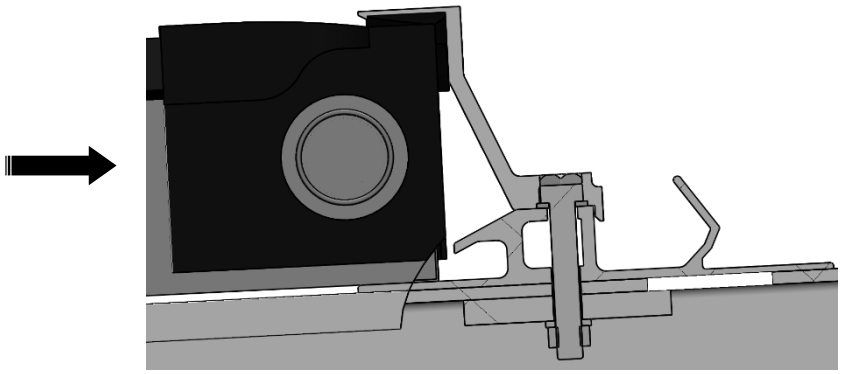


bottom end of collector
in position on Collector Rail

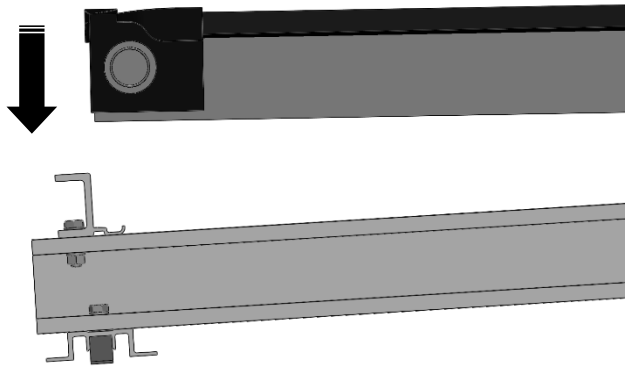
Positioning a Folded-Tray Collector



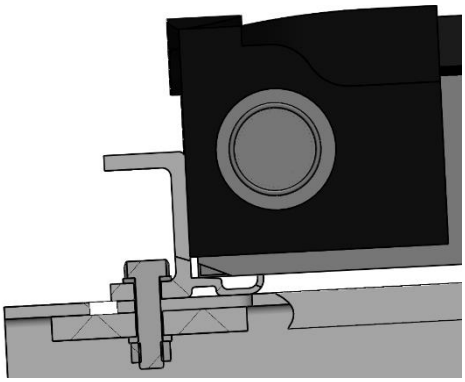
slide collector upwards along C-Channels



slide collector up against the retention feature of the Tank / Collector Rail
and fully engage under the Collector Clamps



lower bottom end carefully
onto the foot of the Collector Rail

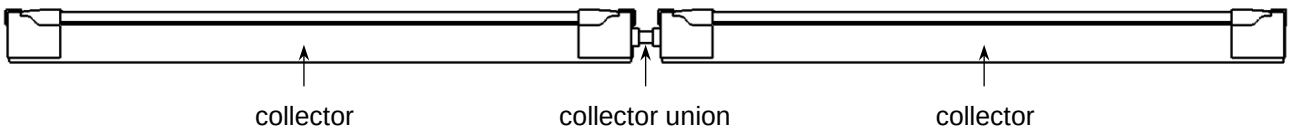


bottom end of collector
in position on Collector Rail

INSTALLING A SECOND COLLECTOR

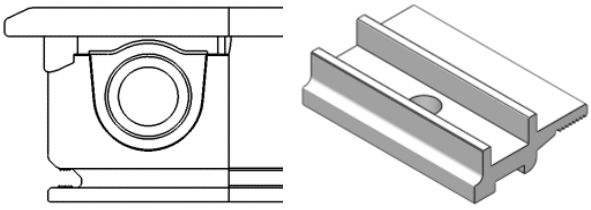
- Insert the two collector unions (two collector system) into the sockets of the first solar collector and loosely screw each gland nut into its socket.
- Position the top of the second solar collector (two collector system) into the Tank / Collector Rail and the bottom of the solar collector onto the bottom Collector Rail, following the same procedure as before.
- Slide the second solar collector over to engage the two collector unions and loosely screw each gland nut into its socket.
- Centralise the solar collector(s) horizontally on the frame and tighten the gland nuts.

Tighten

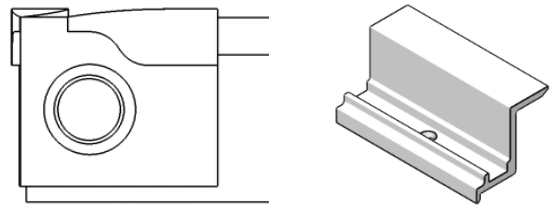


INSTALLING THE COLLECTOR CLAMPS

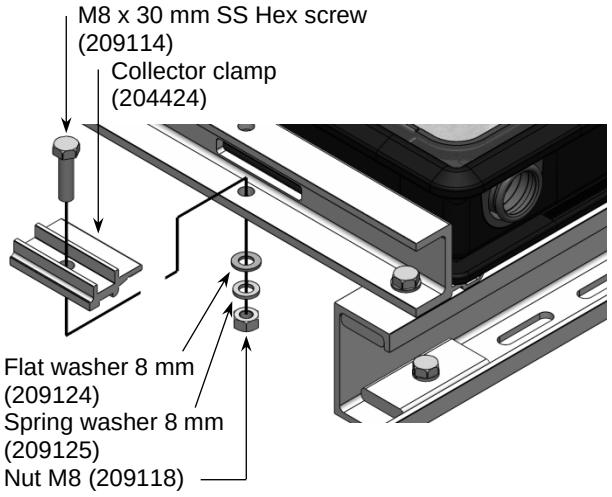
- Loosely fit the Collector Clamps, two per solar collector, to the bottom Collector Rail.
  - The appropriate clamp to suit the collector must be used. Use clamp 204424 for the Envelope collector and clamp 204431 for folded-tray collectors. For Envelope collectors, the clamps are inserted in the slots in the web of the Collector Rail and are fixed to the lower web of the Collector Rail. For folded-tray collectors, the clamps are fixed to the upper web of the Collector Rail.
  - For each clamp, use;
    - one 30 mm screw (209114 - set screw hex M8 x 30 mm SS 304)
    - one 8 mm ID spring washer (209125 - washer spring 8 x 14.3 x 2 mm (G304)) directly under the nut (209118 - nut M8 x 1.25 mm (G304))
    - one 8 mm round washer (209124 - washer flat 8 mm (G304)) located between the spring washer and the Collector Rail.
- Do not tighten the Collector Clamps at this stage as the collectors may need to be moved slightly to accommodate the tank positioning and pipe work.
- Refer also to Detail B on page 38.



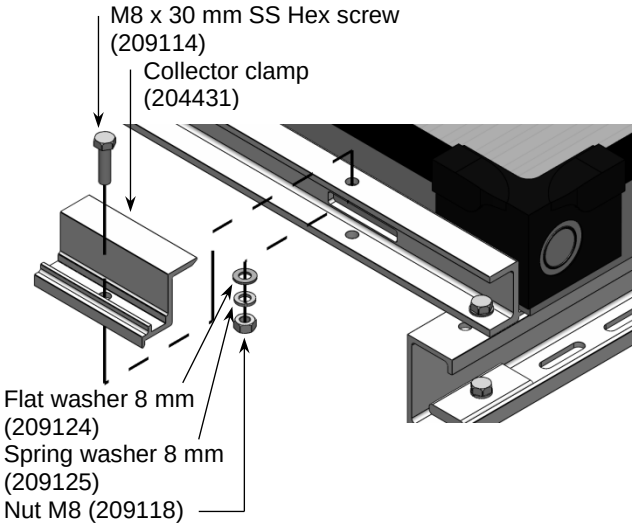
Envelope profile and Collector Clamp – 204424 Collector Rail location



folded-tray profile and Collector Clamp – 204431 Collector Rail location



Envelope collector type

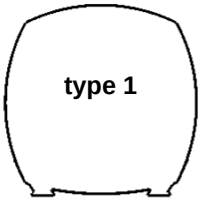


folded-tray collector type

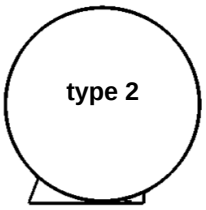
Collector Clamping – Collector Rail

INSTALLING THE SOLAR STORAGE TANK

There are two types of tank which can be installed on the frame. The installation method and components used are determined by the shape of the tank base / feet. The two types are:



Solahart tanks
Rheem 52C, 52D tanks



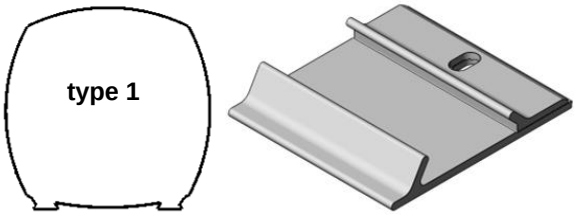
Rheem 52L, 52H tanks

Note: If a system with folded-tray type collectors is being installed, prior to placing the solar storage tank on the frame, check the nut and bolt on each Collector Clamp on the Tank / Collector Rail has been tightened. Access to the nut may be difficult after the tank has been installed.

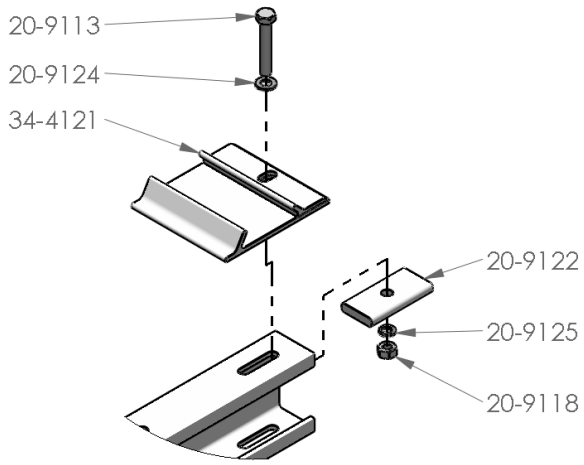
SOLAR STORAGE TANK WITH TWO FLAT FEET – TYPE 1

- Loosely secure the Tank Clamps (344121) to the C-Channels.
  - Separate the top and bottom sections of the Tank Clamps along the part line to obtain two pieces.
    - Place the smaller top piece over the larger bottom piece of the Tank Clamp, ensuring the serrated profiles fit together.
  - Using the slotted hole, approximately 20 mm from the top end of the C-Channel, position the Tank Clamps over the:
    - Two C-Channels for a 150 or 180 tank one collector system.
    - Two outside C-Channels for a 300 tank two collector system.
  - For each fixing, use:
    - one 50 mm screw (209113 - set screw hex M8 x 50 mm SS 304)
    - one 8 mm round washer (209124 - washer flat 8 mm (G304)) located under the screw head.
    - one rectangular washer (209122 - washer rectangular 65 x 32 x 8 mm – aluminium) located under the C-Channel upper web.
    - one 8 mm ID spring washer (209125 - washer spring 8 x 14.3 x 2 mm (G304)) under the nut (209118 - nut M8 x 1.25 mm (G304)).
  - Refer also to Detail E on page 39.

separate top and bottom sections of Tank Clamps

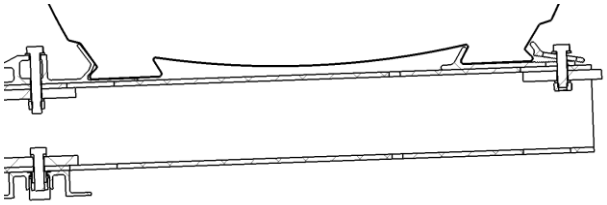


type 1 tank and Tank Clamp – 344121



fit Tank Clamps (for type 1 tank mounting)

- Place the solar storage tank on the frame and centralise.
  - Ensure the lower foot of the solar storage tank is placed against the lip of the Tank / Collector Rail.
  - Ensure the higher foot of the solar storage tank is placed between the two lips of each Tank Clamp. The lip of the bottom half of each Tank Clamp must be hard up against the tank foot.



tank type 1 positioned and secured

- Loosely secure the Tank Clamps. These will be tightened after the connecting solar pipes have been installed.
- Conduct a final alignment of the solar storage tank and solar collectors.

  Note: It is necessary to achieve correct alignment in order for the pipe work to fit up neatly.
- Connect the solar hot and solar cold pipes to the solar storage tank and collectors.

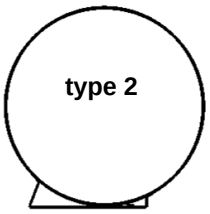
  Refer to the Installation instructions and Owner's Guide supplied with the water heater for details to complete the connections to the solar storage tank and collectors of the solar cold and hot pipe work.
- Tighten the nut and screw at each Collector Clamp and each Tank Clamp, using a spanner.
- Check and securely tighten all other connections on the frame.
- Complete Part 2 – Frame installation of the Check List on page 41.

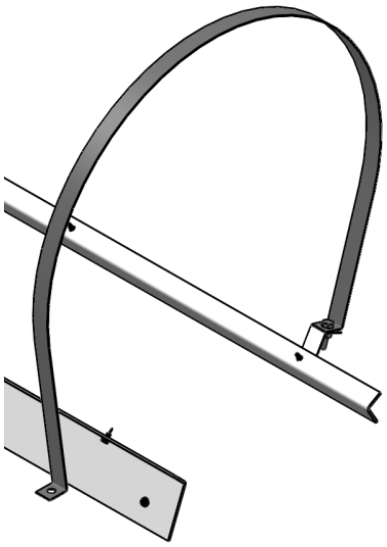
SOLAR STORAGE TANK WITH FLAT BASE – TYPE 2

- Fit the two Long Tank Straps (343060) to the Tank / Collector Rail and two C-Channels.

  Note: The Long Tank Straps (343060) are supplied in the Tank Frame Mounting Kit (PN 12103998 or PN 12103999).
  - Remove the screw and washer sets securing the Tank / Collector Rail to the two outside C-Channels.
  - Position the Long Tank Straps over the Tank / Collector Rail, one at each of these C-Channels, with the foot of the strap orientated outwards away from the tank position.
  - Fix the foot of each Long Tank Strap on top of the Tank / Collector Rail using:
    - one 50 mm screw (209113 - set screw hex M8 x 50 mm SS 304)
    - one 8 mm round washer (209124 - washer flat 8 mm (G304)) located under the screw head and above the long tank strap.
    - one rectangular washer (209122 - washer rectangular 65 x 32 x 8 mm – aluminium) located under the C-Channel upper web.
    - one 8 mm ID spring washer (209125 - washer spring 8 x 14.3 x 2 mm (G304)) under the nut (209118 - nut M8 x 1.25 mm (G304)).

    Refer to the Detail E on page 40 and diagram 'Long Tank Strap to Tank / Collector Rail' on page 56.
  - Tighten the nuts and screws, using a spanner.





Tank Straps and Reinforcement Plates – Tank Frame Mounting Kits 12103998, 12103999

Note: Prior to placing the solar storage tank on the frame, it is necessary to attach the front Reinforcement Plate and Rear Reinforcement Angle to the front and rear faces of the flat base of the tank. For the procedure of connecting the Reinforcement Plate / Angle, refer to the installation instructions (part number 126420) supplied with the 'Tank Frame Mounting Kit'.

- Place the solar storage tank centrally on the frame, wrapping the Long Tank Straps over the tank.
- Ensure the front Reinforcement Plate is placed against the lip of the Tank / Collector Rail.
- Conduct a final alignment of the solar storage tank and solar collectors.

  Note: It is necessary to achieve correct alignment in order for the pipe work to fit up neatly.
- Connect the solar hot and solar cold pipes to the solar storage tank and collectors.

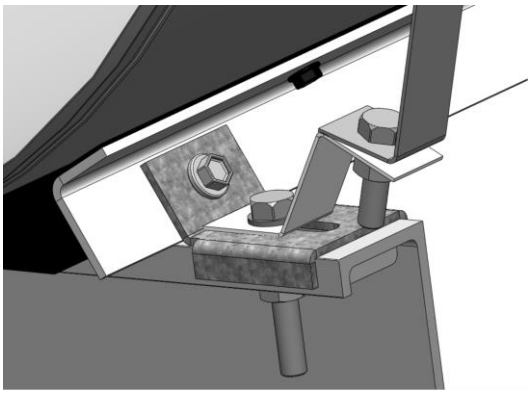
  Refer to the Installation instructions and Owner's Guide supplied with the water heater for details to complete the connections to the solar storage tank and collectors of the solar cold and hot pipe work.
- Tighten the nut and screw at each Collector Clamp, using a spanner, to secure the solar collector(s) after the solar hot and solar cold pipes are connected to the solar storage tank and solar collectors.
- Position the saddle shaped galvanised Tank Clamps (204660) supplied with the Tank Frame Mounting Kit, one to each C-Channel.
  - The shorter angled face of each clamp is to be placed against the rear Reinforcement Angle of the solar storage tank.
  - The hole in the longer angled face is to be over the slotted hole at the top end of the C-Channel.

use 204660
in Tank Frame Mounting Kit

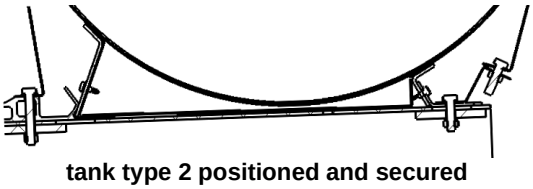
- Fix the Tank Clamp to the Reinforcement Angle with the Tek Screw 14 G x 20 TPI x 22 (080071) supplied with the Tank Frame Mounting Kit.

  Note: Do not use the Tek Screws 10 G x 16 mm supplied in the Tank Frame Mounting Kit for this purpose.
- Fix a Rear (Short) Tank Strap (343203) to each outside Tank Clamp and C-Channel.

  Note: The Rear (Short) Tank Straps (343203) are supplied in the Tank Frame Mounting Kit (PN 12103998 or PN 12103999).
  - Position the Rear (Short) Tank Straps over each of the outside Tank Clamps, with the foot and obtuse angle of the bracket pointing inward toward the tank.
  - Fix each Rear (Short) Tank Strap on top of the Tank Clamp using:
    - one 50 mm screw (209113 - set screw hex M8 x 50 mm SS 304)
    - one 8 mm round washer (209124 - washer flat 8 mm (G304)) located under the screw head and above the Rear (Short) Tank Strap.
    - one rectangular washer (209122 - washer rectangular 65 x 32 x 8 mm – aluminium) located under the C-Channel upper web.
    - one 8 mm ID spring washer (209125 - washer spring 8 x 14.3 x 2 mm (G304)) under the nut (209118 - nut M8 x 1.25 mm (G304)).
  - Tighten the nut and screw at each bracket / Tank Clamp connection, using a spanner.

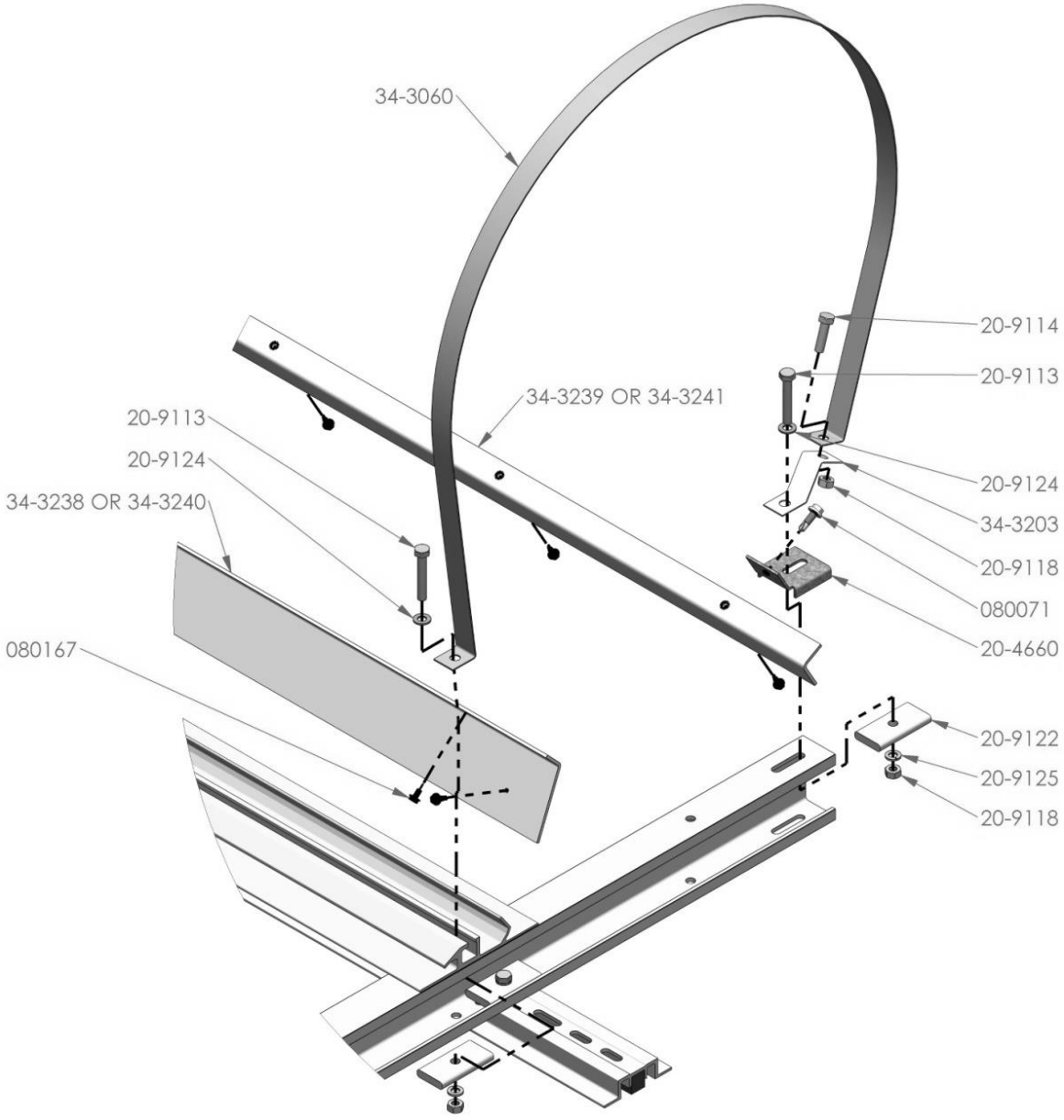


Rear (Short) Tank Strap



tank type 2 positioned and secured

- Fix the foot of each Long Tank Strap to the upper foot of the Rear (Short) Tank Strap using a 30 mm screw (209114 - set screw hex M8 x 30 mm SS 304) and nuts (209118 - nut M8 x 1.25 mm (G304)) provided with the frame.
  - Tighten the nut and screw at each join of the tank straps, using a spanner.
- Check and securely tighten all other connections on the frame.
- Complete Part 2 – Frame installation of the Check List on page 41.



Long Tank Strap to Tank / Collector Rail (for type 2 tank mounting)

SYSTEM CERTIFICATIONS

The structural engineering analysis and design of this With-Pitch frame has been conducted and certified by a certified structural engineer.

The design is in accordance with normal engineering practice and principles and the relevant sections of the following Australian Standards:

- AS / NZS 1170.0:2002 Structural design actions – Part 0: General principles
- AS / NZS 1170.1:2002 Structural design actions – Part 1: Permanent, imposed and other actions
- AS / NZS 1170.2:2011 Structural design actions – Part 2: Wind actions
- AS / NZS 1664.1:1997 Aluminium structures Part 1: Limit design state
- AS / NZS 1684.3:2010 Residential Timber Framed Construction – Cyclonic Areas
- AS 1720.1:2010 Timber structures Part 1: Design methods
- AS 4055:2012 Wind Loads for Housing
- AS 4100:2020 Steel Structures
- AS / NZS 4600:2018 Cold-formed steel structures

To achieve the structural design capacity, it is essential this With-Pitch frame be assembled in accordance with the fixing details as outlined in these installation instructions.

This certification extends to the design of the mounting system only within the limitations imposed. The structural adequacy of the roof to support the additional loading from the solar collectors, outside the limitation imposed, should be determined and certified by a suitably qualified structural engineer.

The design of this frame does not consider the effects of any snow or earthquake loading.

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