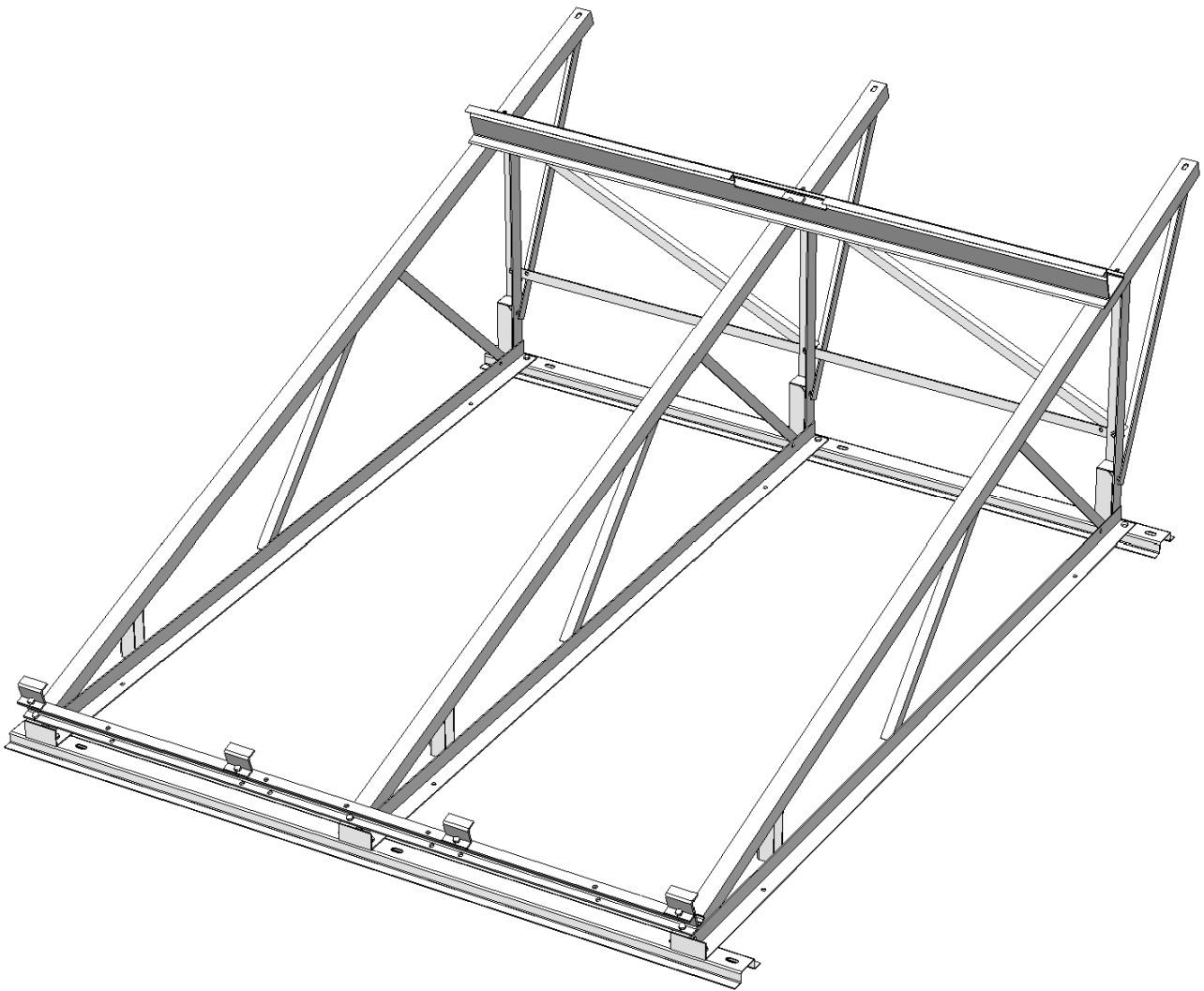


Fixed Pitch Frame
INSTALLATION INSTRUCTIONS
FOR THERMOSIPHON SOLAR WATER HEATER SYSTEMS



*This frame must be installed by an authorised person.
Please leave this guide with the householder.*

SOLAHART INDUSTRIES PTY LTD - ABN 45 064 945 848 – 112 Pilbara Street Welshpool WA 6106 Australia
RHEEM AUSTRALIA PTY LTD - ABN 21 098 823 511 - 1 Alan Street (PO Box 6) Rydalmere NSW 2116 Australia
EDWARDS SOLAR HOT WATER (A Division of Rheem Australia Pty Ltd) – 112 Pilbara Street Welshpool WA 6106
Australia

PATENTS

This Fixed 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

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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.

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ABOUT THE FIXED PITCH FRAME

This installation instruction is used with two model Fixed Pitch frames. These frames are:

- Kit 12106897 Thermosiphon One Collector Fixed Pitch Frame
- Kit 12106898 Thermosiphon Two Collector Fixed Pitch Frame

LIST OF COMPONENTS

Component Part No	Kit 12106897 Thermosiphon One Collector Fixed Pitch Frame Component Description	Quantity
341562	Base plate sub-assembly 1 collector system	2
343223	Rear brace 926 mm long, 1 collector fixed pitch frame	2
344671	Collector rail extra heavy duty (T6) 1 collector frame	1
344677	Tank / collector rail heavy duty (T6) 1 collector frame	1
	Contents of polyethylene bag	1
330350	Set screw hex 5/16" UNC x 3/4" SS	16
348033	Set screw hex 5/16" UNC x 1 1/2" SS	2
348032	Washer round Ø 30 mm x 8 mm SS	2
348034	Washer square 50 x 50 x 8 mm SS	2
330354	Washer 5/16" SS	6
348038	Isolation (fibre) washer ID 5/16 x OD 1 1/16 x 1/32	6
330806	Nut 5/16" SS	14
080071	Screw Tek No. 14 x 20	2
331932	Collector clamp heavy duty	2
344121	Tank clamp Cat D cyclone (aluminium)	2
343038	Tank clamp Rheem (tank clamp round tank – galvanised steel)	2
347136	Installation instructions – Fixed Pitch frame	1

Component Part No	Kit 12106898 Thermosiphon Two Collector Fixed Pitch Frame Component Description	Quantity
343230	Base plate sub-assembly 2 collector system	2
330842	Rear brace angle 1622 mm long fixed pitch frame	1
343211	Cross brace 935 mm long , 2 collector frame	2
344672	Collector rail extra heavy duty (T6) 2 collector frame	1
344678	Tank / collector rail heavy duty (T6) 2 collector frame	1
	Contents of polyethylene bag	1
330350	Set screw hex 5/16" UNC x 3/4" SS	24
348033	Set screw hex 5/16" UNC x 1 1/2" SS	1
348032	Washer round Ø 30 mm x 8 mm SS	1
348034	Washer square 50 x 50 x 8 mm SS	1
330354	Washer 5/16" SS	6
348038	Isolation (fibre) washer ID 5/16 x OD 1 1/16 x 1/32	8
330806	Nut 5/16" SS	19
080071	Screw Tek No. 14 x 20	2
331932	Collector clamp heavy duty	4
344121	Tank clamp Cat D cyclone (aluminium)	2
343038	Tank clamp Rheem (tank clamp round tank – galvanised steel)	2
347136	Installation instructions – Fixed Pitch frame	1

MODEL TYPE

The Fixed Pitch frame mounting kit is designed for flat roof and pitched roof installations.

On Roof Mounting

The frame, when installed using the “On Roof Mounting” connection method, is rated to:

Wind Region	C	Terrain category	TC2	Wind Class *
Ultimate wind speed	69.3 m/s	Height (Hz)	10 m	N4 / C2

* Wind Class has been assessed in accordance with AS 4055-2006 ‘Wind loads for housing’.

Solar Water Heater Systems

The frame is suitable for installation with the systems listed below, including rebranded systems using the same tank designs:

Thermosiphon One Collector Fixed Pitch Frame Kit 1 x 12106897	Thermosiphon Two Collector Fixed Pitch Frame Kit 1 x 12106898
Edwards Thermosiphon Systems	Edwards Thermosiphon Systems
L180, LX180 tank with one collector Tank Frame Mounting Kit (PN 12103998) also required	L180, LX180 tank with two collectors Tank Frame Mounting Kit (PN 12103998) and Tank Frame Support Kit (PN 12103997) also required
–	L305, LX305 tank with two collectors Tank Frame Mounting Kit (PN 12103999) also required
Rheem Thermosiphon Systems	Rheem Thermosiphon Systems
52S160 tank with one collector	52S300 tank with two collectors
52H180 tank with one collector Tank Frame Mounting Kit (PN 12103998) also required	52H300 tank with two collectors Tank Frame Mounting Kit (PN 12103999) also required
Solahart Thermosiphon Systems	Solahart Thermosiphon Systems
150F, 150J, 150L, 150LF tank with one collector	180F, 180J, 180L, 180LF tank with two collectors Tank Frame Support Kit (PN 12103997) also required
180F, 180J, 180L, 180LF tank with one collector	220F, 220J, 220L, 220LF tank with two collectors Tank Frame Support Kit (PN 12103997) also required
220F, 220J, 220L, 220LF tank with one collector	300F, 300J, 300L, 300LF tank with two collectors
Sunheat Thermosiphon Systems	Sunheat Thermosiphon Systems
160D direct system tank with one collector	300D direct system tank with two collectors
180C indirect system tank with one collector	300C indirect system tank with two collectors

Thermosiphon Three Collector Fixed Pitch Frame Kits 1 x 12106897 + 1 x 12106898	Thermosiphon Four Collector Fixed Pitch Frame Kits 2 x 12106898
Edwards Thermosiphon Systems	Edwards Thermosiphon Systems
L305, LX305 tank with three collectors Tank Frame Mounting Kit (PN 12103999) and Screws and Washers Kit (PN 12106868) also required	L440, LX440 tank with four collectors Tank Frame Mounting Kit (PN 12104000) and Screws and Washers Kit (PN 12106868) also required
L440, LX440 tank with three collectors Tank Frame Mounting Kit (PN 12104000) and Screws and Washers Kit (PN 12106868) also required	–
Solahart Thermosiphon Systems	Solahart Thermosiphon Systems
300F, 300J, 300L, 300LF tank with three collectors Screws and Washers Kit (PN 12106868) also required	440F, 440J, 440L, 440LF tank with four collectors Screws and Washers Kit (PN 12106868) also required
440F, 440J, 440L, 440LF tank with three collectors Screws and Washers Kit (PN 12106868) also required	–
Sunheat Thermosiphon Systems	
300C indirect system tank with three collectors Screws and Washers Kit (PN 12106868) also required	

PARTS SUPPLIED

This kit contains 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.

This kit does not include the hardware for mounting the frame to the roof.

The tank clamps, collector clamps, screws, washers and nuts supplied with this kit must be used with these frames. They replace the tank clamps, collector clamps, screws, washers and nuts that may be supplied in the parts kit or pipe kit supplied with the solar water heater, and must not be used with the Fixed Pitch frame.

TANK FRAME MOUNTING KIT

The Edwards L and LX solar tanks and Rheem 52H solar tanks require a tank frame mounting kit to be assembled to the flat base of these tanks. The required kit for each tank is supplied separately to the Fixed Pitch frame.

The kit part numbers are:

- 12103998 Tank Frame Mounting Kit L180, LX180, 52H180
- 12103999 Tank Frame Mounting Kit L305, LX305, 52H300
- 12104000 Tank Frame Mounting Kit L440, LX440

TANK FRAME SUPPORT KIT

The Solahart 180 litre and 220 litre tanks and Edwards 180 litre tanks, when installed with two solar collectors on a fixed pitch frame, require a tank frame support kit to be assembled to the frame. The required kit is supplied separately to the Fixed Pitch frame.

The kit part number is:

- 12103997 Frame Support Kit 182 222 Fixed Pitch

LOCATION

The installation of a thermosiphon solar water heater on this frame, subject to its design criteria and certification not being exceeded:

- provides an acceptable method of installation where it is necessary to satisfy the requirements of the Building Code of Australia for high wind areas, and
- is suitable for installation with a thermosiphon solar water heater in geographic locations up to and within Wind Region C (where the “On Roof Mounting” method is used) as defined in the Building Code of Australia, Australian Standard AS 4055-2006 and the Australian / New Zealand Standard AS/NZS 1170.2:2002.

Refer to “System Certifications” on page 30 for information on the certification of each system.

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. Choose a mounting location with direction in mind that will allow the frame to be centrally located over at least either two rafters (one collector system) or three rafters (two collector system) and also provide the base plate sub-assemblies with suitable fixing access to the roof battens.

The installer must ensure the structural integrity of the building is not compromised by the solar water heater and frame installation and the roof structure is suitable to carry the full weight of the solar storage tank, solar collector(s) and frame. If in doubt the roof structure should be suitably strengthened. Consult a structural engineer.

SCREWS AND WASHERS KIT

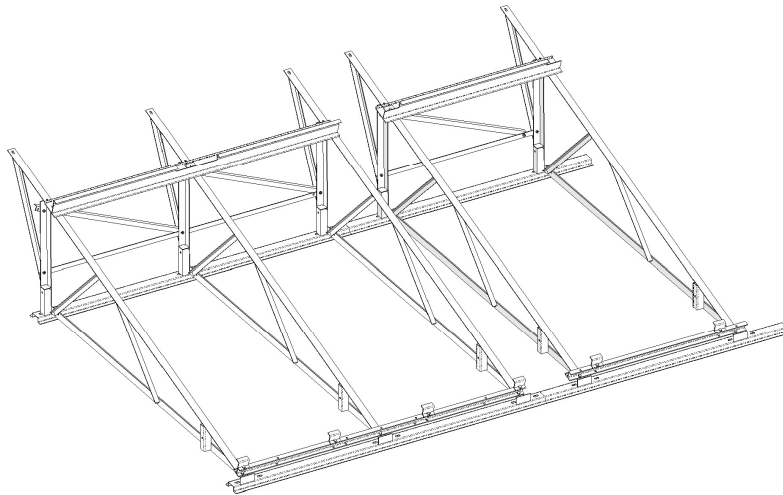
The three and four collector thermosiphon systems are subject to a higher wind loading due to their wider collector surface areas. The two Fixed Pitch frames supporting a three or four collector system require additional washers and longer screws to be assembled to the frame. The required kit is supplied separately to the Fixed Pitch frames.

The kit part number is:

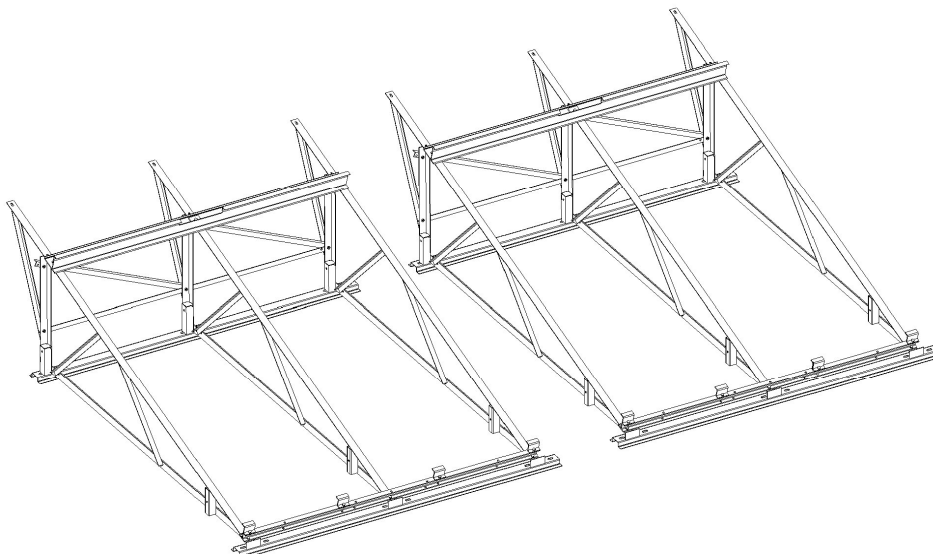
- 12106868 Screws and Washers Kit for 3 and 4 Collector Fixed Pitch

Component Part No	Kit 12106868 Screws and Washers Kit, 3 & 4 Collector Frame Component Description	Quantity
348033	Set screw hex 5/16" UNC x 1 1/2" SS	10
348032	Washer round Ø 30 mm x 8 mm SS	10
347228	Installation instruction sheet – Screws and Washers Kit	1

For the installation of a three collector thermosiphon system on a fixed pitch (flat roof) frame arrangement, a one collector fixed pitch frame (340301) and a two collector fixed pitch frame (340302) are required to be installed side by side.



For the installation of a four collector thermosiphon system on a fixed pitch (flat roof) frame arrangement, two of the two collector fixed pitch frames (340302) are installed side by side.



For the installation of the one collector fixed pitch frame (340301) in a three collector frame arrangement, an additional two set screws and two washers are required (replacing two set screws 330350). Refer to Diagram 7 on page 16 for the location of the additional screws and washers.

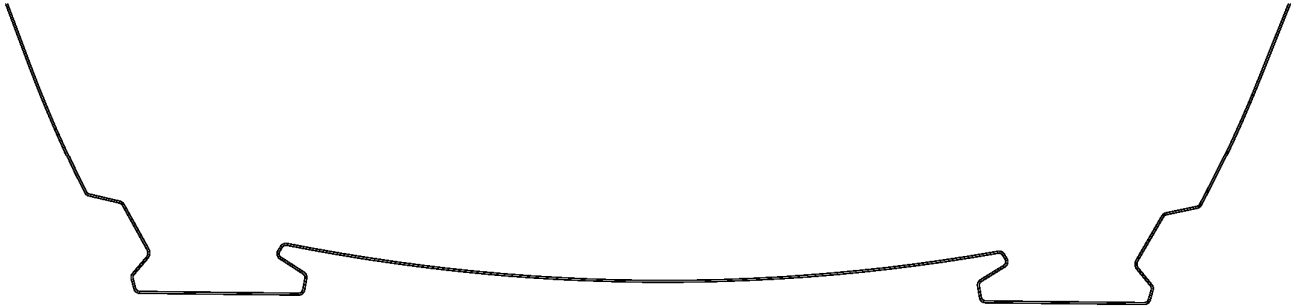
For the installation of a two collector fixed pitch frame (340302) in either a three or four collector frame arrangement, an additional five set screws and five washers are required (replacing five set screws 330350). Refer to Diagram 8 on page 16 for the location of the additional set screws and washers.

A total of 10 round washers $\text{Ø } 30 \times 8$ (348032) and 10 set screw hex $5/16''$ UNC x $1 \frac{1}{2}''$ SS (348033) are supplied with this kit. Therefore a total of 7 washers and 7 set screws are used in a thermosiphon 3 collector installation and all 10 washers and 10 set screws are used for a thermosiphon 4 collector installation. The $1 \frac{1}{2}''$ long set screws are used at the locations where the washers are fitted in lieu of the $\frac{3}{4}''$ long set screws (PN 330350) supplied with the original frame kit.

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 Fixed Pitch frame. Each design of tank base and feet has its own unique method of connecting to the frame.

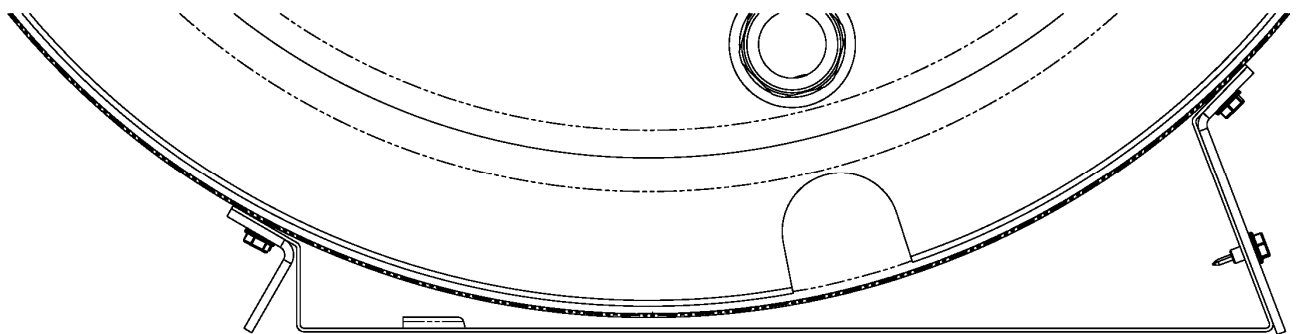
The types of tank base design and supporting feet are:



**Solar Storage Tank with Two Flat Feet and Curved Base
(Solahart tanks and Sunheat closed circuit 'C' tanks)**



**Solar Storage Tank with Z-section Feet
(Rheem Hiline 52S tanks and Sunheat direct 'D' tanks)**



**Solar Storage Tank with Flat Base and Reinforcement Plates
(Edwards L and LX tanks and Rheem Premier Hiline 52H tanks)**

ASSEMBLY DIAGRAMS

SOLAR STORAGE TANK WITH TWO FLAT FEET – FRAME ASSEMBLY

Solahart tanks and Sunheat 'C' style tanks

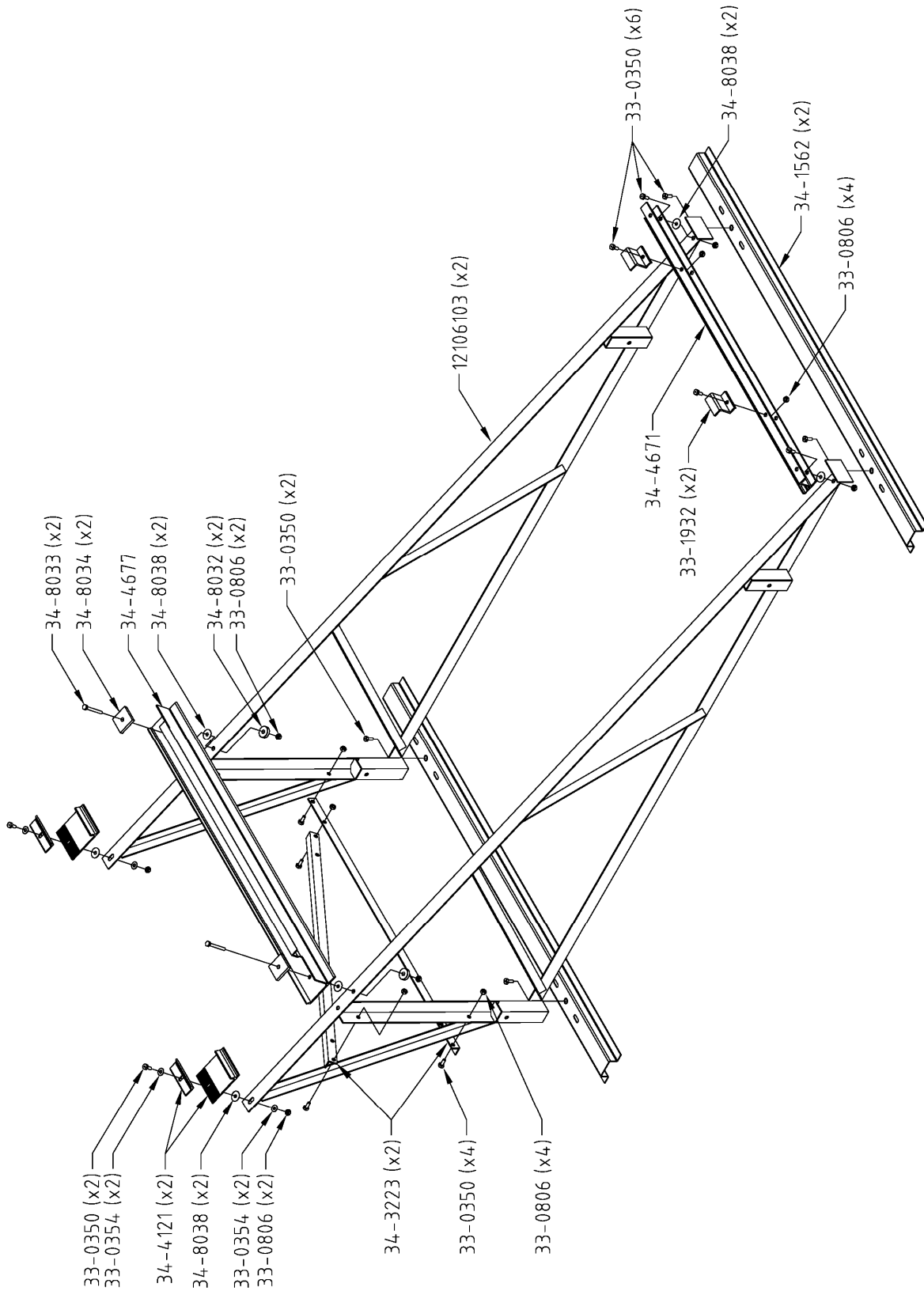


Diagram 1
Thermosiphon One Collector Fixed Pitch Frame Kit No 12106897

Solahart tanks and Sunheat 'C' style tanks

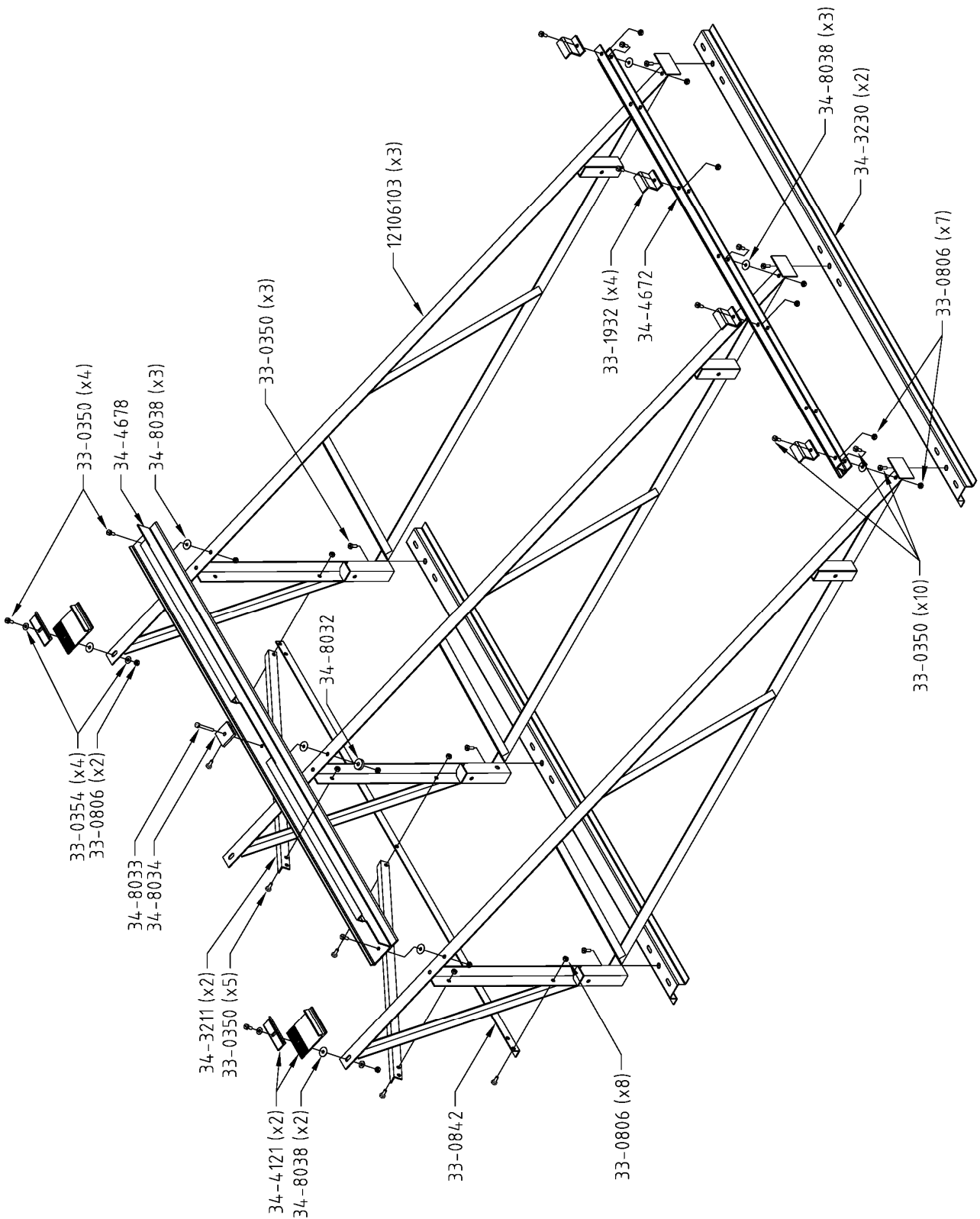


Diagram 2
Thermosiphon Two Collector Fixed Pitch Frame Kit No 12106898

SOLAR STORAGE TANK WITH Z-SECTION FEET – FRAME ASSEMBLY

Rheem 52S tanks and Sunheat 'D' style tanks

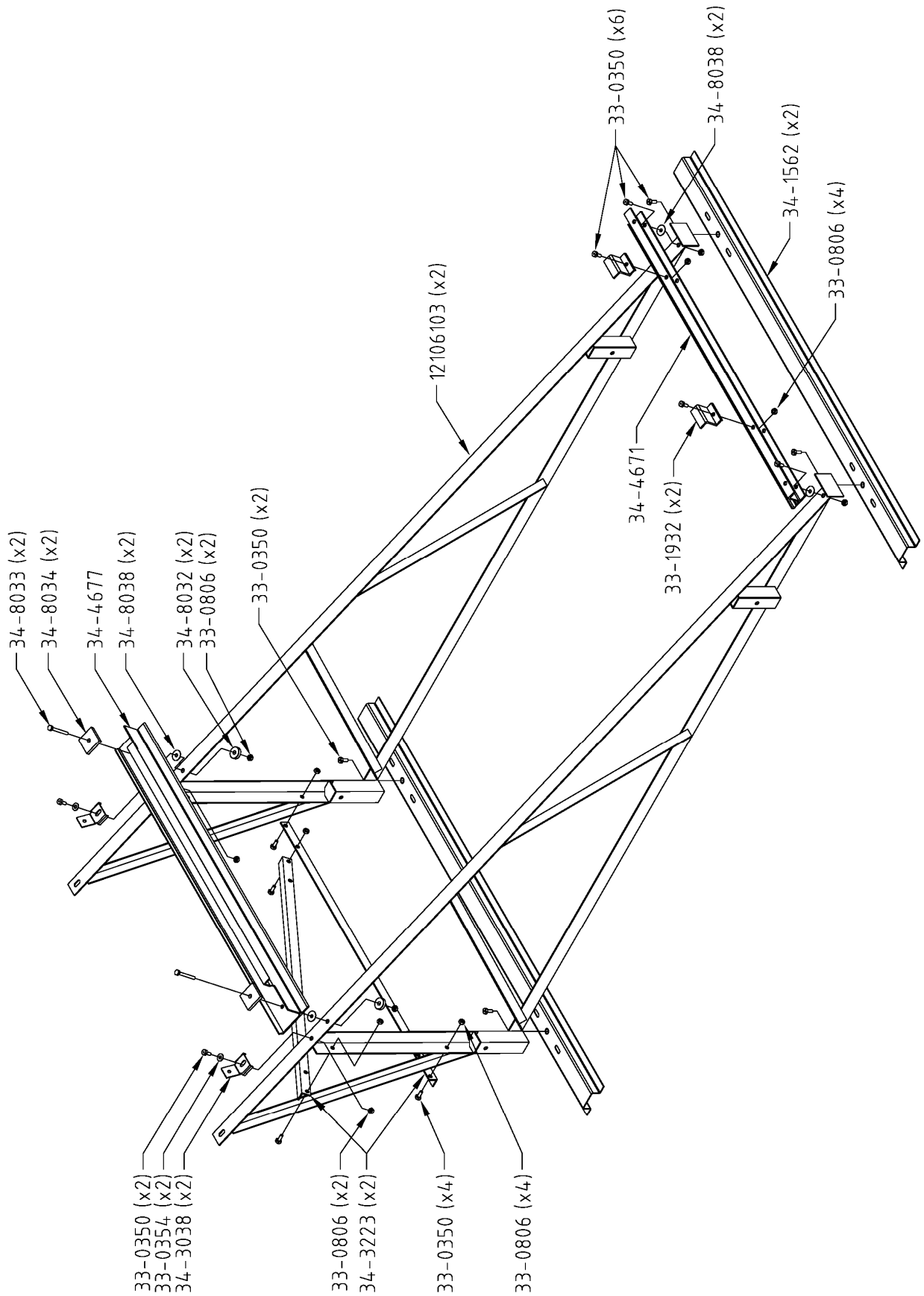


Diagram 3
Thermosiphon One Collector Fixed Pitch Frame Kit No 12106897

Rheem 52S tanks and Sunheat 'D' style tanks

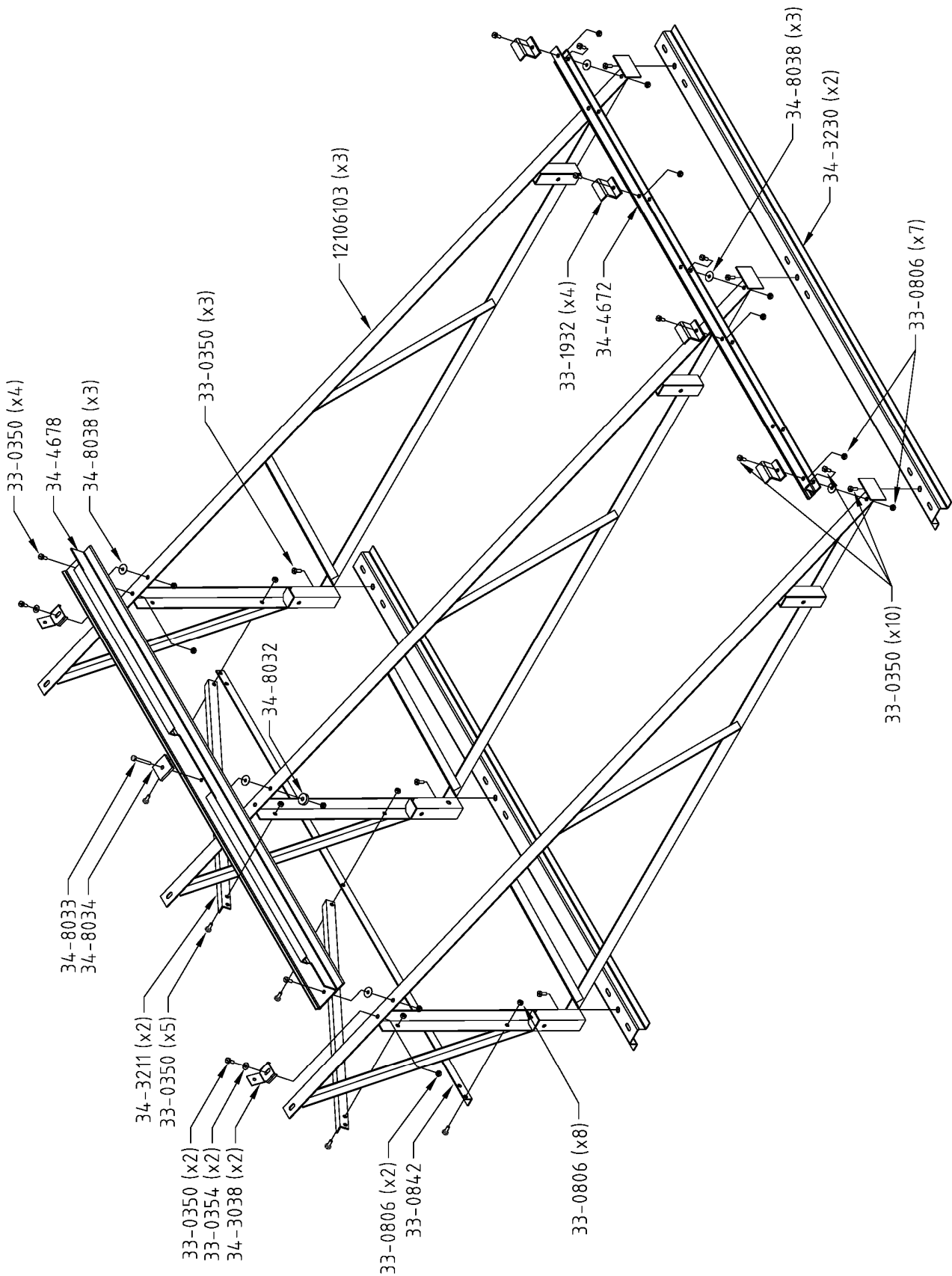


Diagram 4
Thermosiphon Two Collector Fixed Pitch Frame Kit No 12106898

SOLAR STORAGE TANK WITH FLAT BASE – FRAME ASSEMBLY

Edwards 'L' and 'LX' tanks and Rheem 52H style tanks

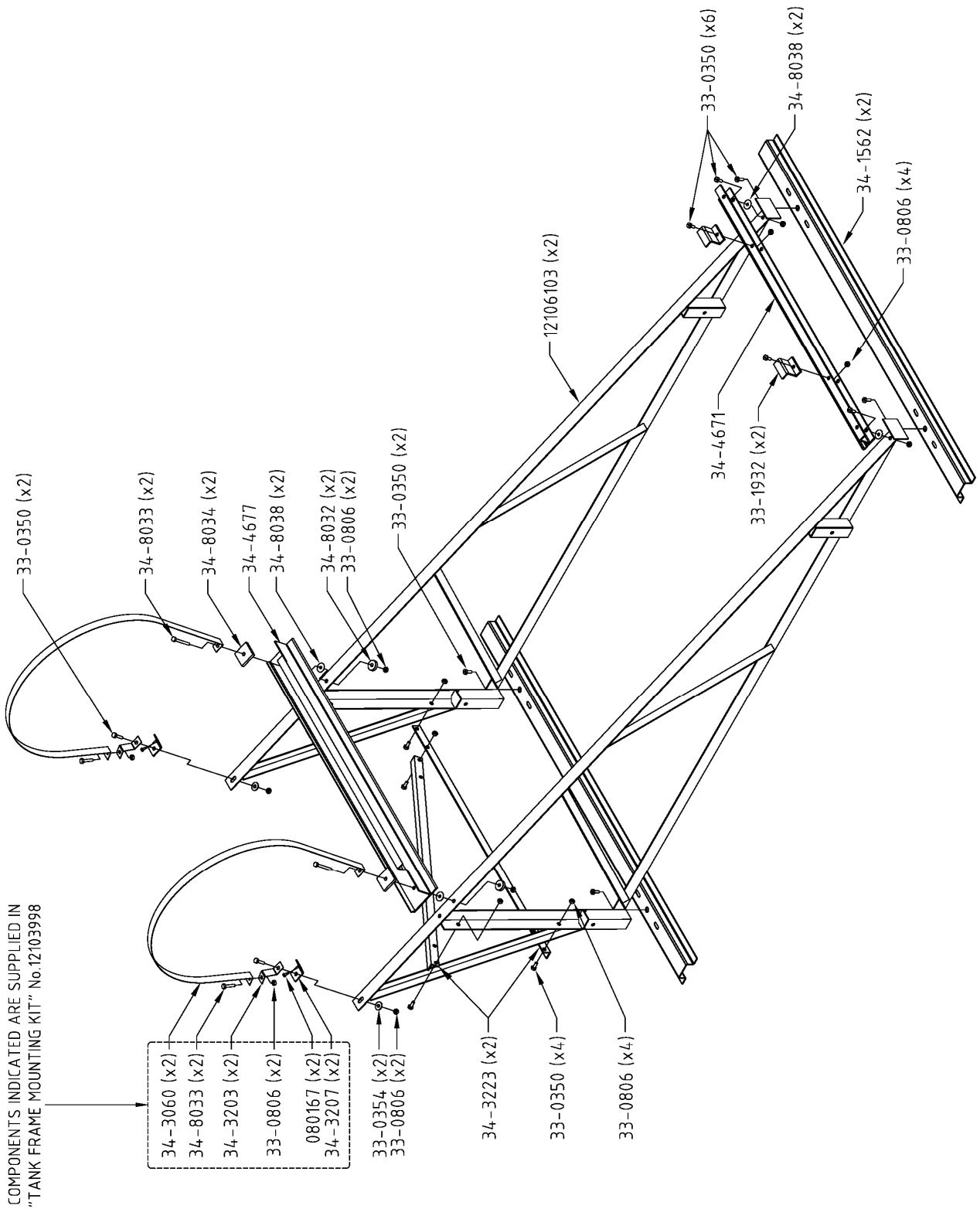


Diagram 5
Thermosiphon One Collector Fixed Pitch Frame Kit No 12106897
(with Tank Frame Mounting Kit Components – 12103998)

Edwards 'L' and 'LX' tanks and Rheem 52H style tanks

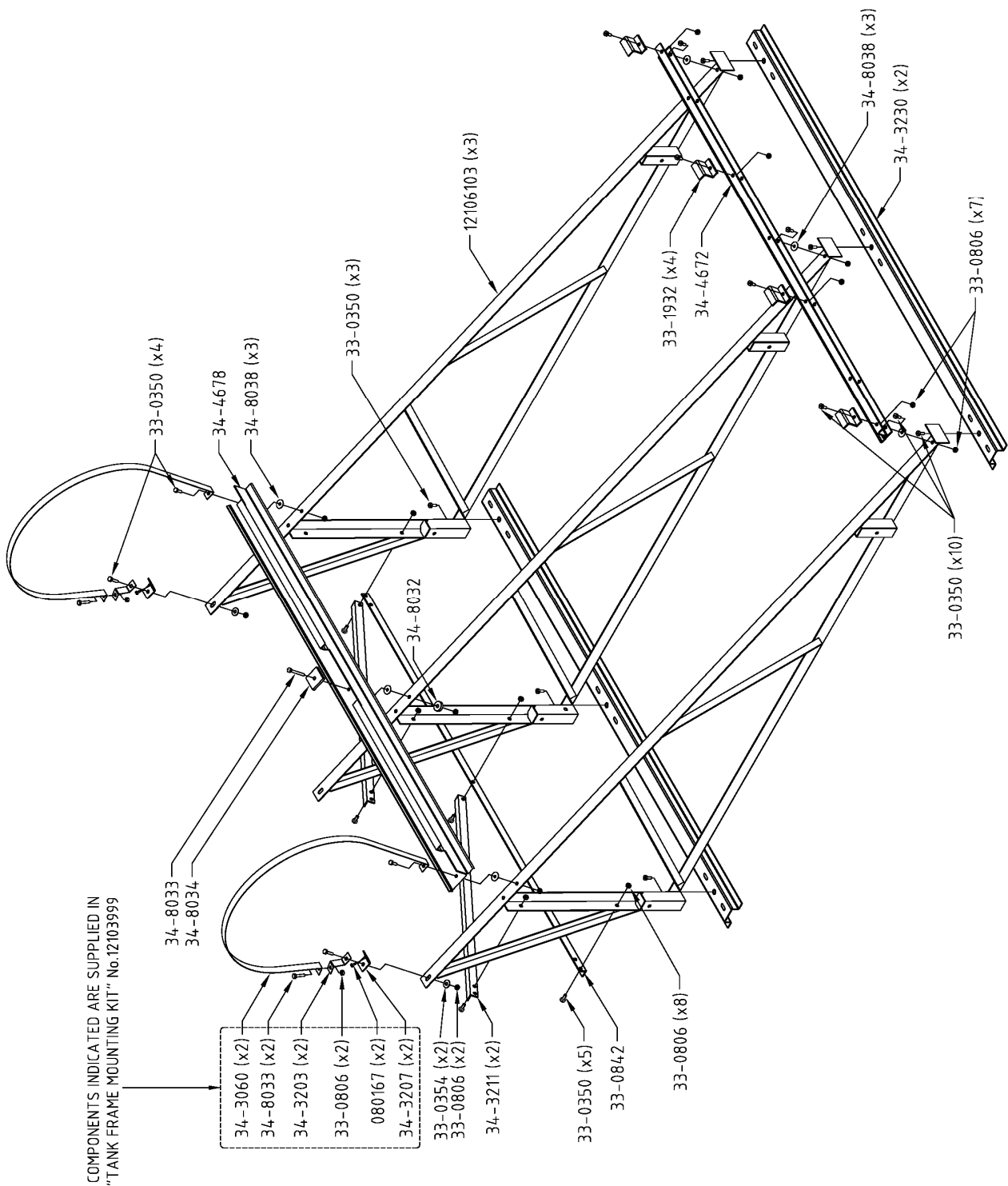
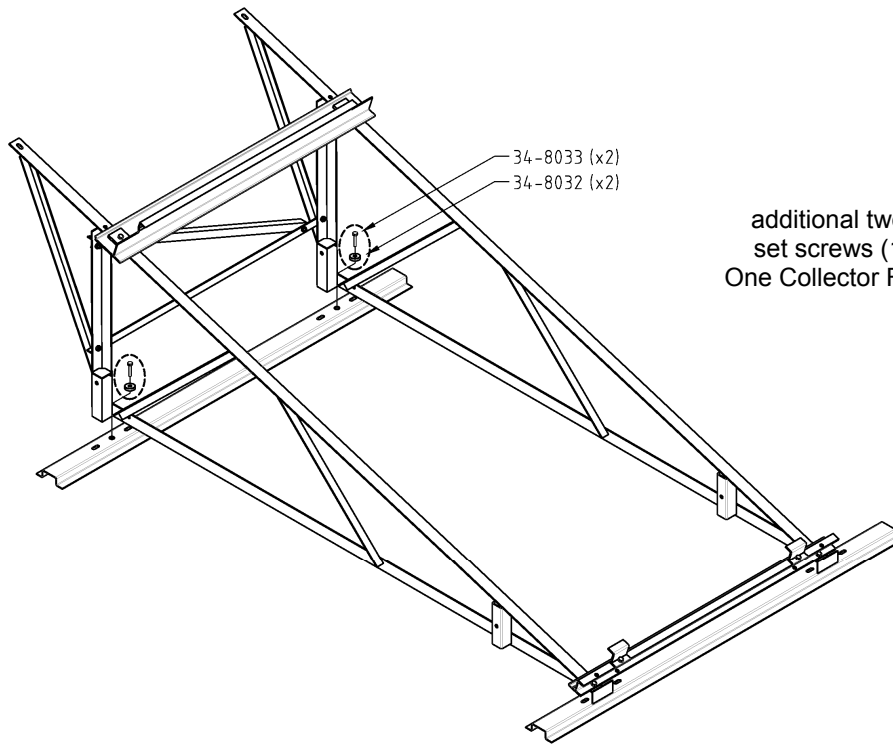


Diagram 6
Thermsiphon Two Collector Fixed Pitch Frame Kit No 12106898
(with Tank Frame Mounting Kit Components – 12103999)

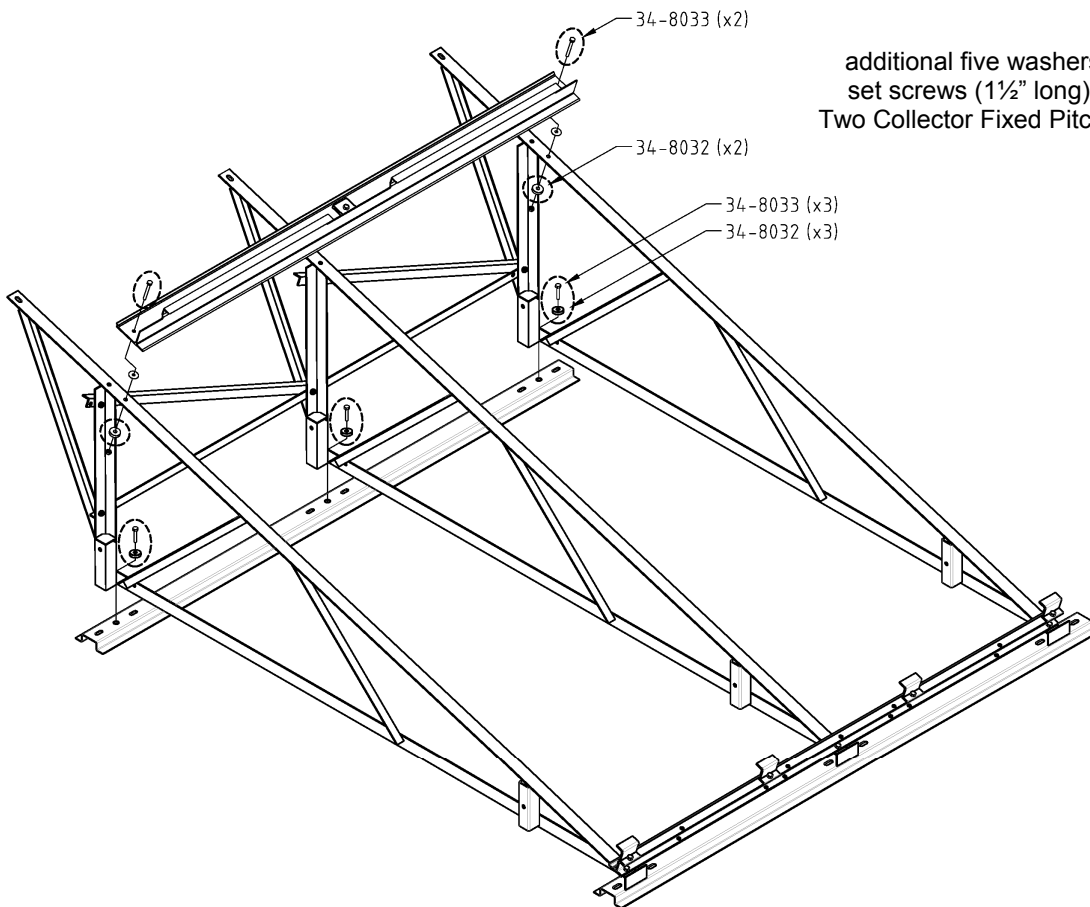
THREE AND FOUR COLLECTOR SYSTEM – FRAME ASSEMBLY

Screws and Washers Kit (12106868)– screw and washer location



additional two washers and set screws (1½” long) for a One Collector Fixed Pitch frame

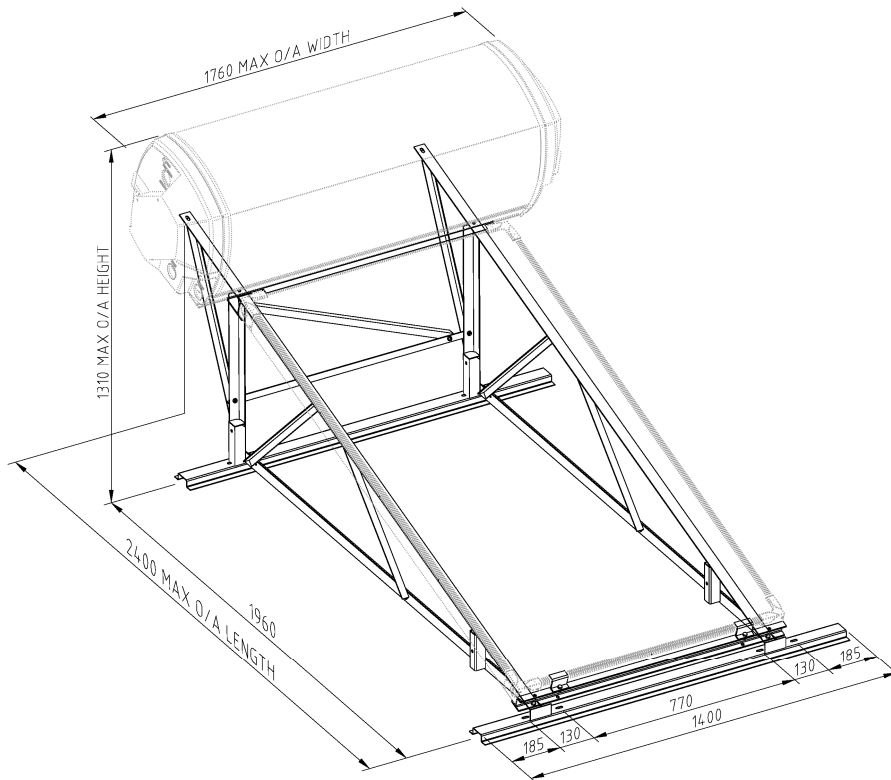
Diagram 7
One Collector Frame – Screw and Washer Location



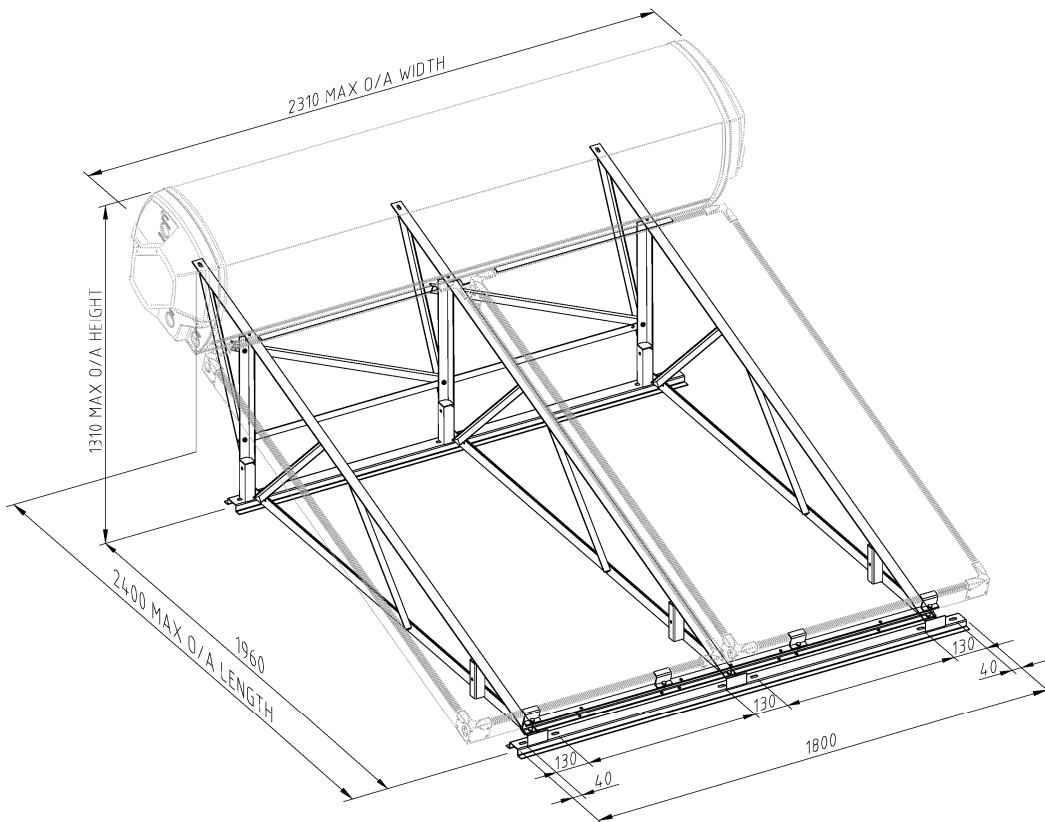
additional five washers and set screws (1½” long) for a Two Collector Fixed Pitch frame

Diagram 8
Two Collector Frame – Screw and Washer Location

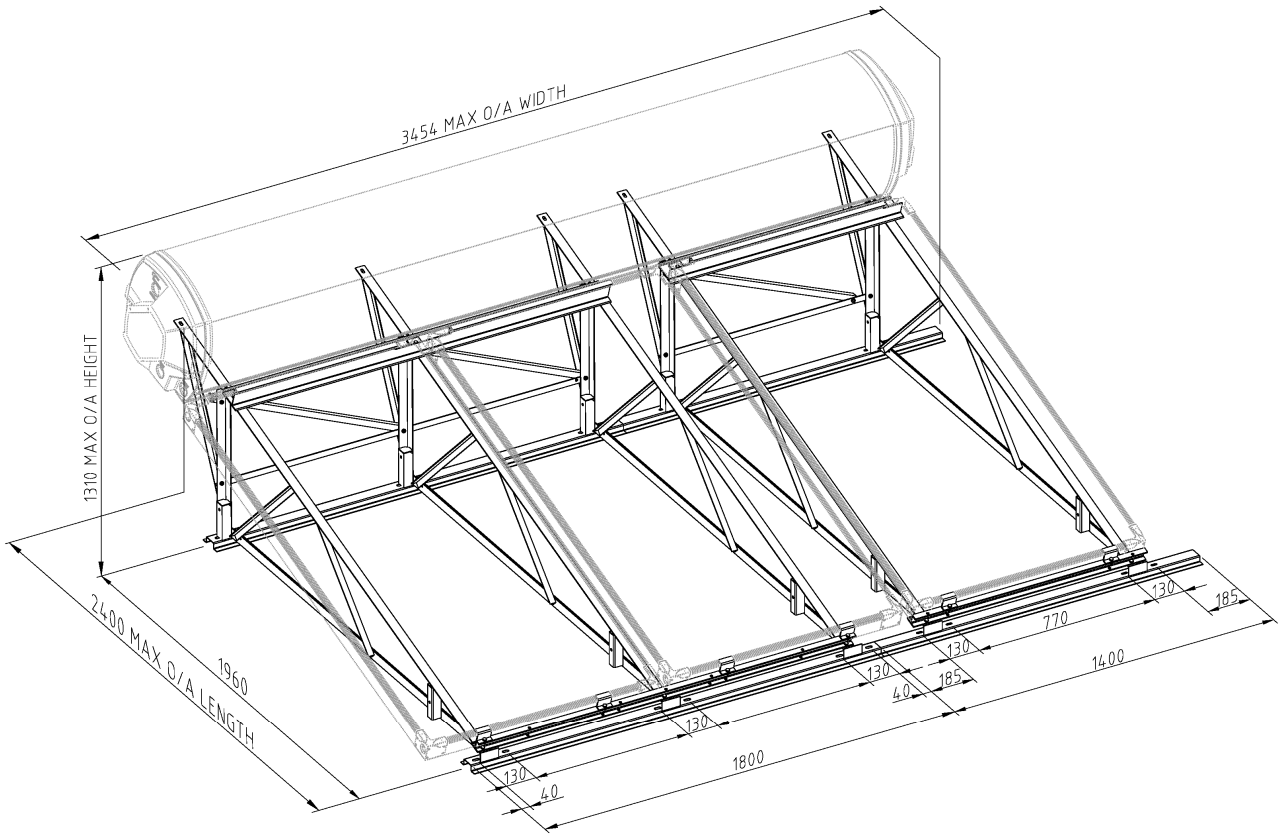
DIMENSION DRAWINGS



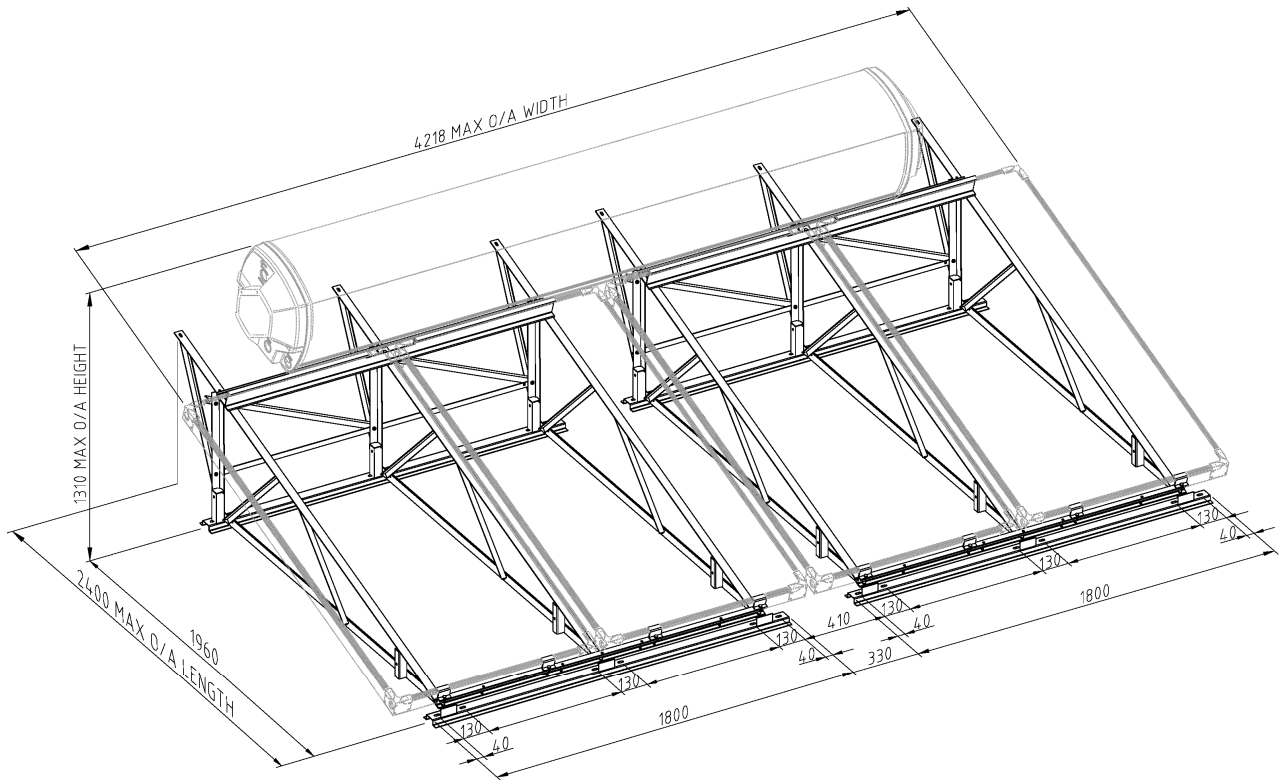
Thermosiphon One Collector Fixed Pitch Frame



Thermosiphon Two Collector Fixed Pitch Frame



Thermosiphon Three Collector Fixed Pitch Frame



Thermosiphon Four Collector Fixed Pitch Frame

INSTALLATION CRITERIA

GENERAL DESIGN CRITERIA, LIMITATIONS AND NOTES

- The total combined roof and frame pitch angle is not to exceed 45°. The maximum roof pitch can be 27°.
- Trusses and rafters spacing is not to exceed 1200 mm centres.
- This frame is not rated for installation on a free roof or a canopy as defined in AS 1170.2:2002 section 5.
- The roof construction should be verified to ensure that it can support the additional loads imposed by the installation of the solar collectors and the frame.
- The roof battens are to be continuous over not less than three rafters or trusses for either a one or two collector frame.
- Frames are certified for use in Australia.
- The installation shall be in accordance with these installation instructions.
- The installer is to provide the fixings for the frame to the roof. Fixings are to be in accordance with the methods and drawings outlined in these installation instructions.

ON ROOF MOUNTING

The “On Roof Mounting” method is suitable for roof types other than tiled roofs.

Refer to the assembly diagrams on pages 10 to 16;

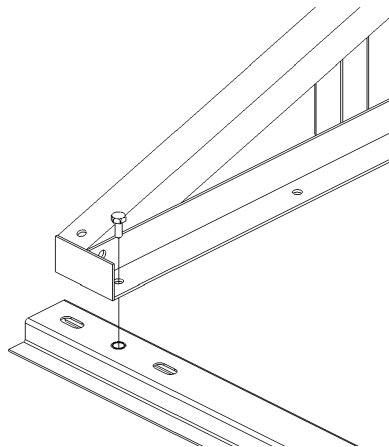
- Diagram 1 (one collector) or Diagram 2 (two collectors) if installing a system with a solar storage tank with two flat feet and curved base – Solahart tanks and Sunheat ‘C’ style tanks, or to
- Diagram 3 (one collector) or Diagram 4 (two collectors) if installing a system with a solar storage tank with Z-section feet and curved base – Rheem 52S tanks and Sunheat ‘D’ style tanks, or to
- Diagram 5 (one collector) or Diagram 6 (two collectors) if installing a system with a solar storage tank with a flat base – Edwards ‘L’ and ‘LX’ tanks and Rheem 52H style tanks.
- Diagram 7 (one collector frame) and / or Diagram 8 (two collector frame) if installing a three or four collector thermosiphon system.

To assemble the Fixed Pitch frame and install on the roof:

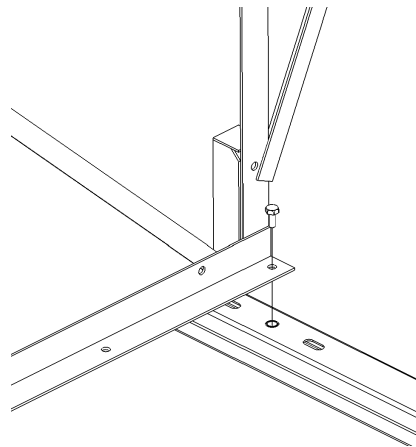
- Determine the position on the roof where the frame and solar water heater is to be installed.
 - Select the position of and install the two roof battens to which the Fixed Pitch frame is to be fixed.
 - The roof battens are to be a minimum 75 mm x 50 mm hardwood timber or a 104 mm x 27 mm x 2 mm top hat section and securely fixed to each rafter or truss.
 - The roof battens are to be continuous over not less than three rafters or trusses for either a one or two collector frame.
 - The centre to centre distance between the two roof battens is to be either 1450 mm, 1700 mm, 1710 mm or 1960 mm. Check this distance with the distance between the two holes on the bottom chord of an A-frame which are to be used to secure the base plates to the A-frame and ensure the distances are equal.
- *Base Plate and A-frame Connections:* Loosely fit the base plates and the A-frames together, using screws (hex 5/16” UNC x ¾” SS – 330350) provided, securing a screw into each nutsert in the base plates.

Note – three or four collector system: If installing two frames side by side for a three or four collector system, at the rear connection of each A-frame to the rear base plate, use one screw (hex 5/16” UNC x 1 ½” SS – 348033) and washer (round Ø 30 x 8 mm SS – 348032) per fixing (from the Screws and Washers Kit – 12106868), instead of the screw (hex 5/16” UNC x ¾” SS – 330350). Refer to Diagram 7 and Diagram 8 on page 16.

There are two base plates per frame and two A-frames with a one collector frame and three A-frames for a two collector frame.



front of A-frame– assembly guidelines



rear of A-frame – assembly guidelines

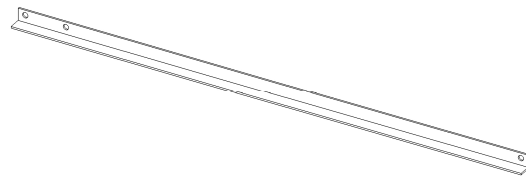
- **Rear/Cross Brace connections:** Connect two rear braces to the two A-frames on a one collector frame or one rear brace and two cross braces to the three A-frames on a two collector frame.

Rear and Cross Braces: The rear brace has two holes at one end of the vertical face and one hole at the other end of the vertical face for a one collector frame and two holes at either end and one in the middle of the vertical face for a two collector frame.

The cross brace has two holes at one end of the vertical face and one hole at the other end of the vertical face. The horizontal faces of these braces have no holes.

Rear Brace and A-frame connection – One Collector Frame: Connect each end of the first rear brace horizontally to the lower hole on the vertical leg of each of the A-frames. The horizontal face of the rear brace is to be below the vertical face. Use one screw (hex 5/16" UNC x 3/4" SS – 330350) and nut (5/16" SS – 330806) per fixing.

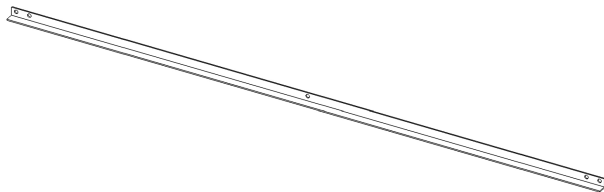
Connect the second rear brace diagonally with the horizontal face of the rear brace is to be above the vertical face. Connect one end of the second rear brace to the upper hole of the vertical leg of the A-frames and another end of the second rear brace to the inner hole of the horizontal (first) rear brace. Use one screw (hex 5/16" UNC x 3/4" SS – 330350) and nut (5/16" SS – 330806) per fixing.



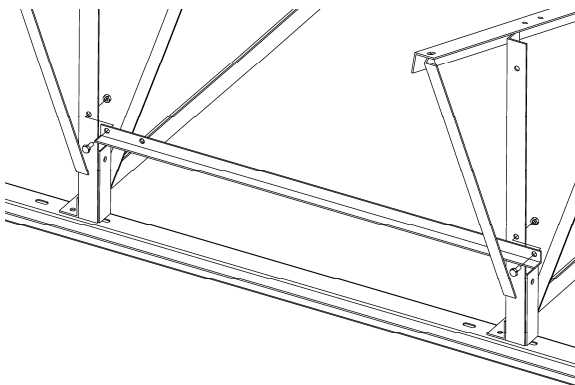
rear brace of one collector frame



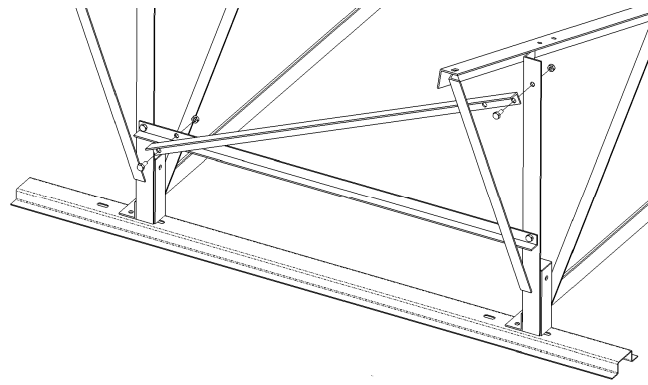
rear brace of two collector frame



cross brace of two collector frame

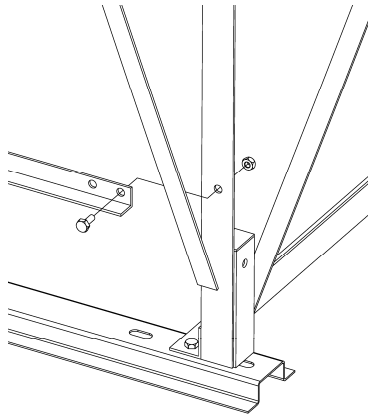


rear brace and A-frame connection
one collector frame

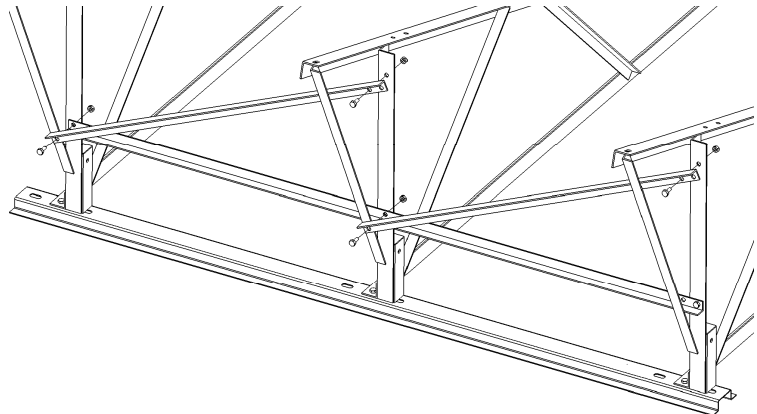


rear brace and A-frame connection
one collector frame

Rear/Cross Brace and A-frame connection – Two Collector Frame: Connect the right end of the rear brace to the lower hole on the vertical leg of the outside A-frame. The horizontal face of the rear brace is to be below the vertical face. Use one screw (hex 5/16" UNC x 3/4" SS – 330350) and nut (5/16" SS – 330806) per fixing.



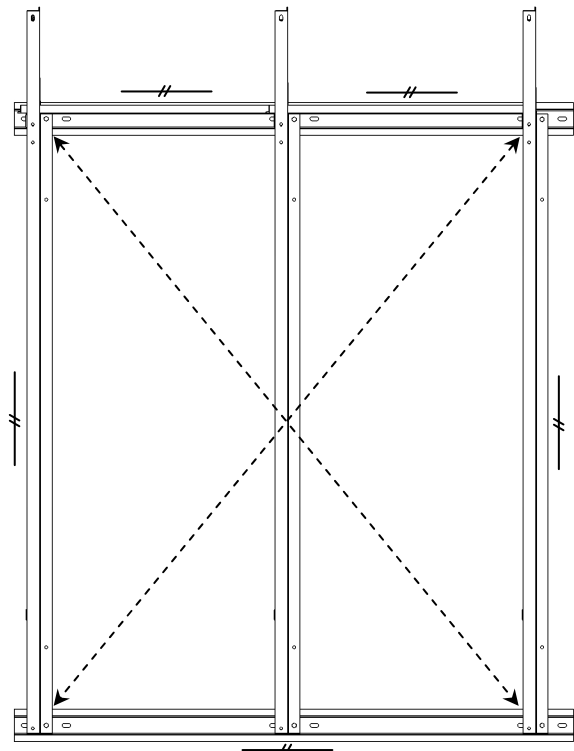
**rear brace and A-frame connection
two collector frame**



**cross braces and A-frame connection
two collector frame**

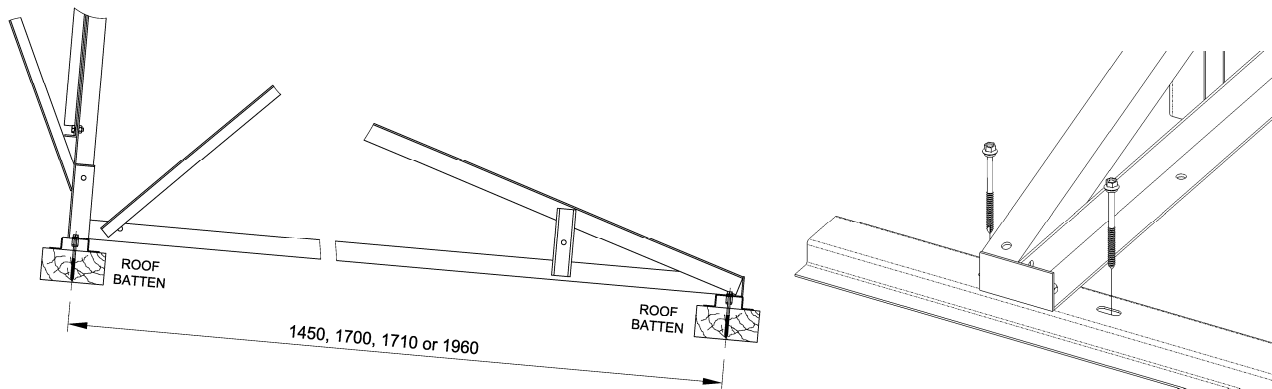
Connect the cross braces diagonally with the horizontal face of the rear braces to be above the vertical face. Connect the inner hole of the cross braces to the upper hole of the vertical leg of the A-frames and another end to the connection of the rear brace and A-frame. Also connect together the middle A-frame, rear brace and cross brace. Use one screw (hex 5/16" UNC x 3/4" SS – 330350) and nut (5/16" SS – 330806) per fixing.

- Square up the frame by making sure the diagonals 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.
 - Tighten up the screws in the nutserts.
- Position the assembled frame on the roof over the area where it is to be installed, ensuring the base plates are located over the two roof battens.
 - The frame should be located such that the Tek screws or M8 bolts are as close as possible to the rafters or trusses.



square up frame and check distances

- Mark the locations where the Tek screws or M8 bolts are to penetrate the roof material.
 - No. 14 Type 17 HWF Tek Screws are required to fix the base plate to timber battens.
 - M8 bolts are required to fix the base plate to steel battens.
 - The Tek screws or M8 bolts penetrate both the top and bottom base plate through the slotted holes, one on either side of each of the A-frames.
 - There are four fixing points on each base plate for a one collector frame and eight fixing points on each base plate for a two collector frame.
 - Drill through the roof cladding and into the battens.



bolts or Tek screws to penetrate either side of A-frame

- *Timber battens:* Fasten the base plates to timber roof battens using No. 14 Type 17 HWF Tek screws.
 - The Tek screws must penetrate at least 45 mm into the roof battens.
This is the minimum fixing requirement. Refer to Diagram 9 on page 24 for a connection detail.
- *Steel battens:* Fasten the base plates to steel roof battens using M8 bolts and nuts with 20 mm washers under both the bolt head and nut. This is the minimum fixing requirement.
- Refer to “Installation of Collector / Tank Rails” on page 25 for the procedure to install the collector rail, tank / collector rail and tank clamps to the Fixed Pitch frame assembly.

Notes:

- Penetrations through the roofing material must be:
 - at the high point of the roof or metal sheet profile;
 - made neatly and kept as small as practicable;
 - waterproofed upon installation of the Tek 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.

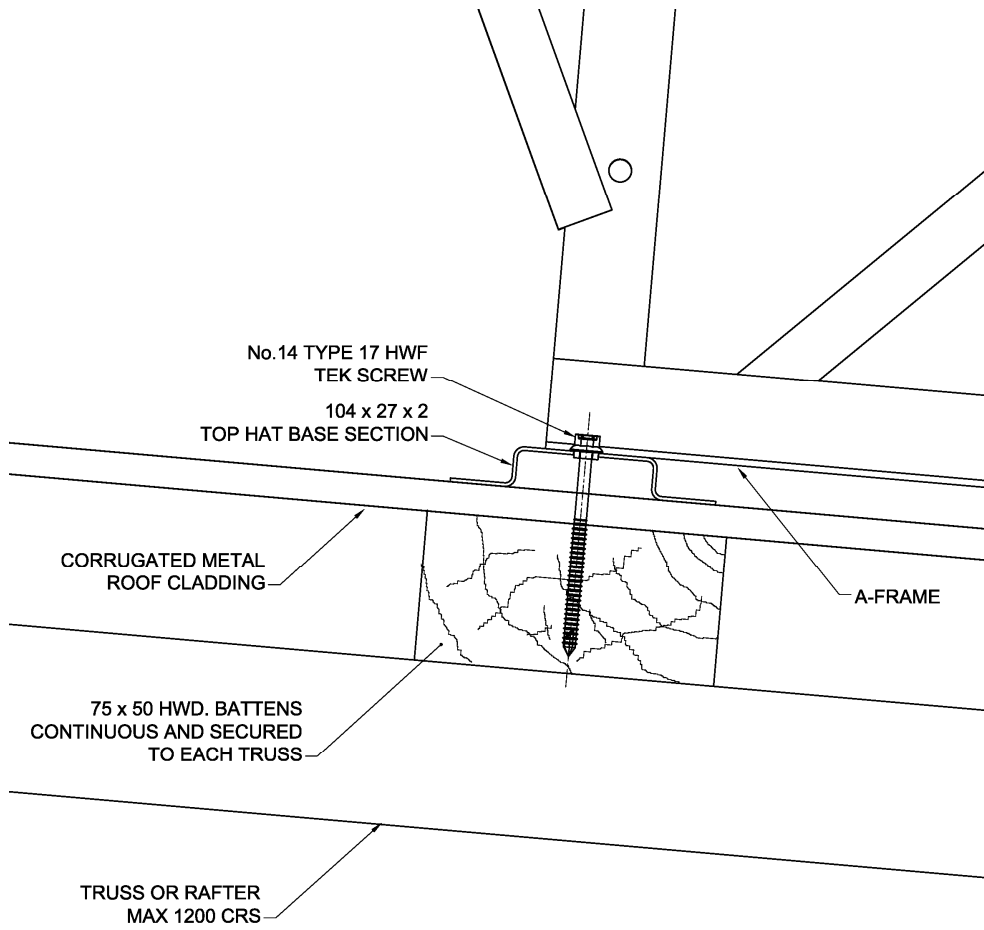
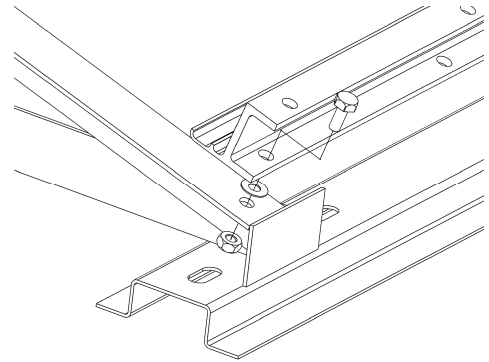


Diagram 9
On Roof Mounting Tek Screw into Timber Batten

INSTALLATION OF COLLECTOR / TANK RAILS

To install the collector rail and tank / collector rail to the Fixed Pitch frame assembly:

- Connect the collector rail across the bottom end of the A-frames.
 - Secure each connection with one screw (hex 5/16" UNC x 3/4" SS – 330350), one fibre isolation washer (ID 5/16 x OD 1 1/16 x 1/32 – 348038) and one nut (5/16" SS – 330806).
 - The fibre isolation washer is to be placed between the collector rail and top chord to act as a separation barrier.
 - Tighten up the nuts and screws.

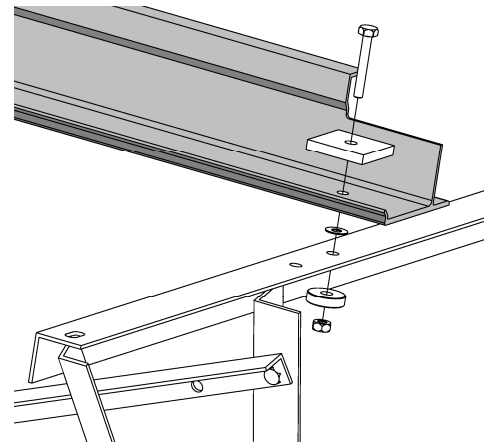


fit collector rail

- Connect the tank / collector rail across the top end of the A-frames.

- *One Collector Frame*

- Secure each connections with one screw (hex 5/16" UNC x 1 1/2" SS – 348033), one fibre isolation washer (ID 5/16 x OD 1 1/16 x 1/32 - 348038), one washer (square 50 mm x 50 mm x 8 mm SS - 348034) under the screw head, one washer (round Ø 30 x 8 mm SS – 348032) under the nut and one nut (5/16" SS – 330806).

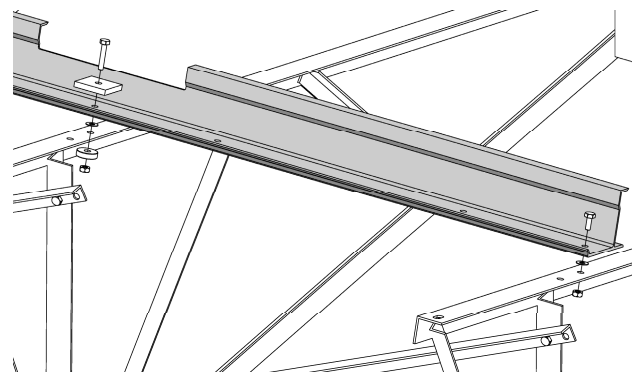


fit tank / collector rail
one collector frame

- *Two Collector Frame*

- Secure the middle connection with one screw (hex 5/16" UNC x 1 1/2" SS – 348033), one fibre isolation washer (ID 5/16 x OD 1 1/16 x 1/32 - 348038), one washer (square 50 mm x 50 mm x 8 mm SS – 348034) under the screw head, one washer (round Ø 30 x 8 mm SS – 348032) under the nut and one nut (5/16" SS – 330806).

- Secure the outer connections with one screw (hex 5/16" UNC x 3/4" SS – 330350), one fibre isolation washer (ID 5/16 x OD 1 1/16 x 1/32 – 348038) and one nut (5/16" SS – 330806).



fit tank / collector rail
two collector frame

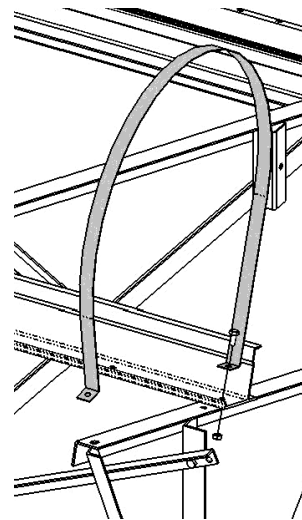
Note – three or four collector system: If installing two frames side by side for a three or four collector system, secure the outer connections of the two collector frame with one screw (hex 5/16" UNC x 1 1/2" SS – 348033), one fibre isolation washer (ID 5/16 x OD 1 1/16 x 1/32 – 348038), one washer (round Ø 30 x 8 mm SS – 348032) and one nut (5/16" SS – 330806) per fixing.

Use a screw and washer from the Screws and Washers Kit – 12106868, instead of the screw (hex 5/16" UNC x 3/4" SS – 330350). Refer to Diagram 7 and Diagram 8 on page 16.

- The fibre isolation washer is to be placed between the tank / collector rail and top chord to act as a separation barrier.
- Tighten up the nuts and screws.

- *Solar storage tank with flat base:*

- Also fit the Long Tank Straps (343060) to the tank / collector rail at each of the outside A-frames.
 - The Long Tank Strap foot, which is orientated inwards, is to be positioned under the screw head and above the washer (square 50 mm x 50 mm x 8 mm SS – 348034) for a one collector frame. For a two collector frame, there is no square washer under the screw head at the outside A-frames.
 - **Note:** The Long Tank Strap (343060) is supplied in the Tank Frame Mounting Kit (PN 12103998 or PN 12103999).

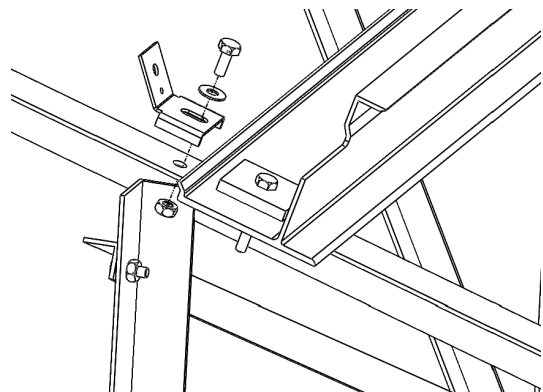


fit Long Tank Strap to tank / collector rail
(tank with flat base only)

- Tighten up the nuts and screws.

- *Solar storage tank with Z-section feet:*

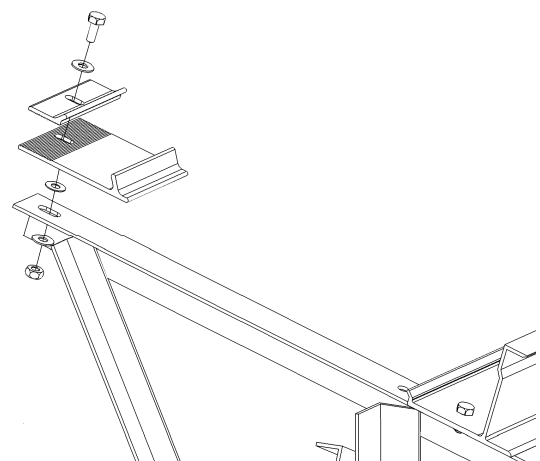
- Loosely fit the two Rheem tank clamps (343038) to the two outside A-frames, using one screw (hex 5/16" UNC x 3/4" SS – 330350), washer (round 5/16" SS – 330354) and nut (5/16" SS – 330806) per clamp.
 - Use the middle of the three holes provided approximately 385 mm from the top end of the A-frame. This is the hole immediately adjacent to the top tank / rail collector.
 - Locate the washer under the screw head.
 - Loosely tighten the nuts and screws.



fit tank clamps (for Z-section feet)

- *Solar storage tank with two flat feet:*

- Loosely secure the two tank clamps to the two outside A-frames, using one screw (hex 5/16" UNC x 3/4" SS – 330350), two washers (round 5/16" SS – 330354), one fibre washer (ID 5/16 x OD 1 1/16 x 1/32 - 348038) and one nut (5/16" SS – 330806) per clamp.
 - It is necessary to part the top and bottom halves of the tank clamps along the part line to obtain the two pieces.
 - Place the narrower top half over the wider bottom half of the tank clamp, ensuring the serrated profiles fit together.
 - Use the slotted hole, approximately 20 mm from the top end of the A-frame.
 - Use three washers per fixing;



fit tank clamps (for tank with two flat feet)

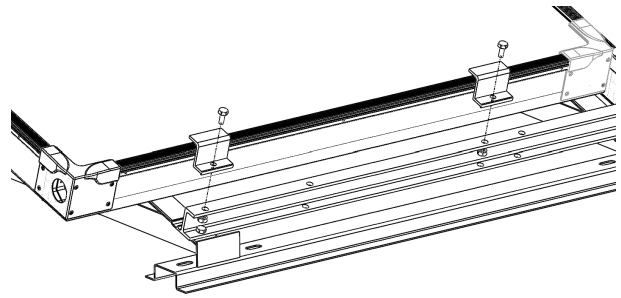
- ❖ Use one washer (round 5/16" SS – 330354) under the screw head and another one under the nut.
- ❖ Use one fibre isolation washer (ID 5/16 x OD 1 1/16 x 1/32 - 348038) between the tank clamps and top chord to act as a separation barrier

- Refer to "Installation of Tank and Solar Collectors" on page 27 to complete the installation.

INSTALLATION OF TANK AND SOLAR COLLECTORS

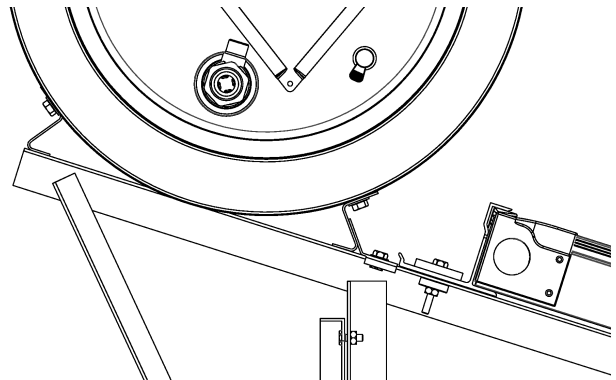
To install the solar storage tank and the solar collectors onto the Fixed Pitch frame assembly:

- Position the top of the first solar collector into the tank / collector rail and the bottom of the solar collector onto the bottom collector rail.
- 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.
- Slide the second solar collector over the two collector unions and loosely screw each gland nut into its socket.
- Centralise the solar collector(s) on the frame and tighten the gland nuts (two collector system).
- Loosely fit the collector clamps, two per solar collector, to the bottom collector rail, using one screw (hex 5/16" UNC x 3/4" SS – 330350) and nut (5/16" SS – 330806) for each clamp.



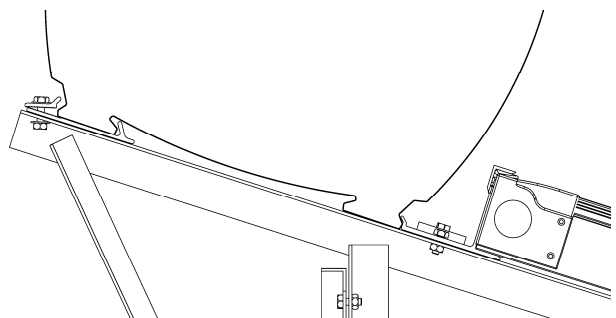
loosely fit collector clamps

- *Solar storage tank with Z-section feet:*
 - Place the solar storage tank on the frame and centralise.
 - Ensure the lower foot of the solar storage tank is placed under the lip of each Rheem tank clamp.



position storage tank (with Z-section feet)

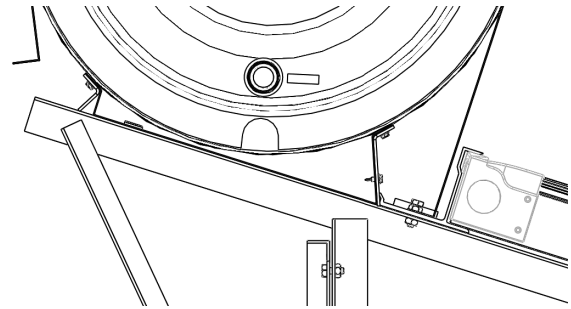
- *Solar storage tank with two flat feet:*
 - Place the solar storage tank on the frame and centralise.
 - Ensure the lower foot of the solar storage tank is placed against the lip of the tank / collector rail.
 - Ensure the upper foot of the solar storage tank is placed between the two lips of each tank clamp. The lip of the bottom half of each tank clamp must be hard up against the tank foot.



position storage tank (with two flat feet)

- *Solar storage tank with flat base*

- **Note:** Prior to placing the solar storage tank on the frame, it is necessary to attach the front and rear reinforcement plates to the front and rear faces of the flat base of the tank. Refer to the installation instructions supplied with the 'Tank Frame Mounting Kit' for the procedure of connecting the reinforcement plates.
- Place the solar storage tank on the frame, wrapping the Long Tank Straps over the tank and centralise.
- Ensure the front reinforcement plate is placed against the lip of the tank / collector rail.

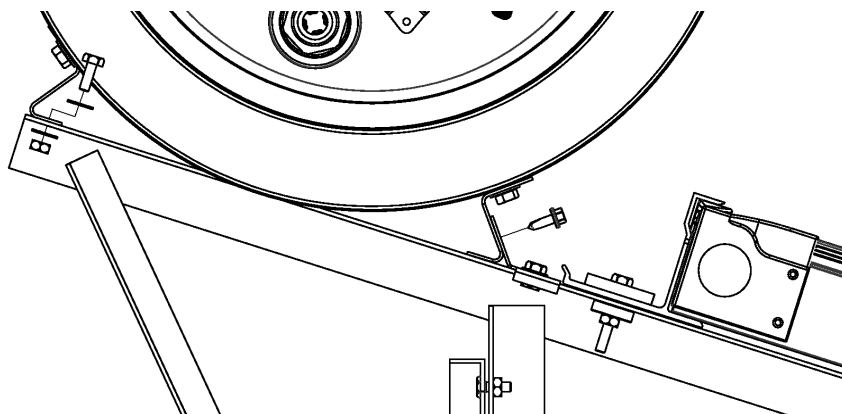


**position storage tank
(with flat base and reinforcement plates)**

- Conduct a final alignment of the solar storage tank and solar collectors.
 - It is necessary to achieve correct alignment in order for the pipe work to fit up neatly.
- Refer to the Installation instructions and Owner's Guide supplied with the water heater for details to complete for the connections to the solar storage tank and solar collector of the solar cold and solar hot pipe work.
- Tighten up the nut and screw at each collector clamp to secure the solar collector(s), when the solar hot and solar cold pipes are in position and connected to the solar storage tank and solar collectors.

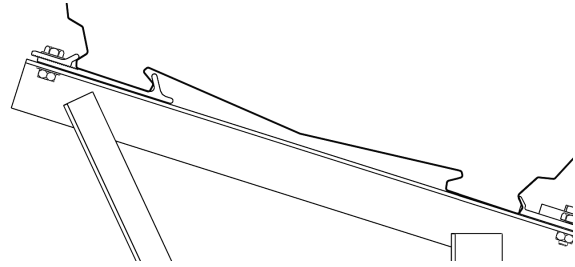
- *Solar storage tank with Z-section feet:*

- Secure the Z-section foot at the top end of the solar storage tank to each of the A-frames, using one screw (hex 5/16" UNC x 3/4" SS – 330350), two washers (round 5/16" SS – 330354) and one nut (5/16" SS – 330806) per connection.
 - Use two washers per fixing;
 - ❖ Use one washer under the screw head and another one under the nut.
 - Tighten up the nuts and screws.
- Align each tank clamp against the Z-section foot at the front of the solar storage tank and tighten the nuts and screws.
- Secure each tank clamp to the Z-section foot at the front of the solar storage tank, using a No. 14 x 20 Tek screw (080071) provided.



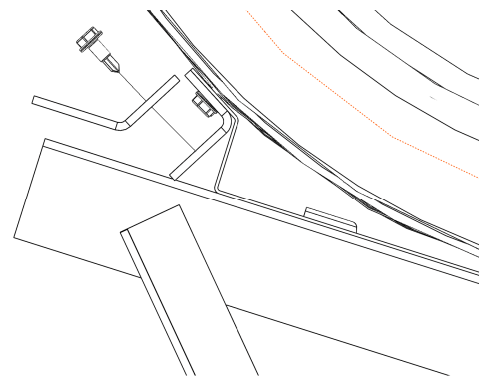
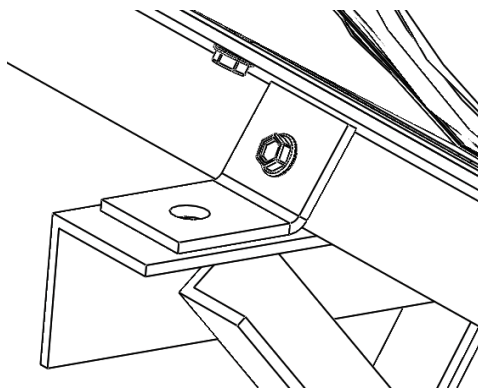
**secure Z-section feet at top side of the tank with screw, washers and nut
secure Z-section feet at bottom side of tank with Tek screw**

- Solar storage tank with two flat feet:
 - Position the top plate of the mounting clamp.
 - Tighten up the nut and screw at each tank clamp to secure the solar storage tank.



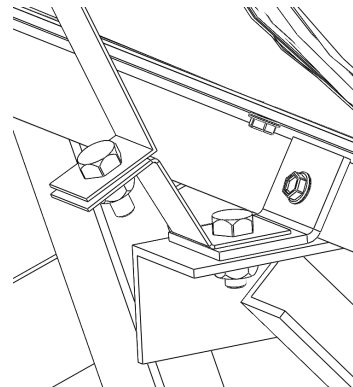
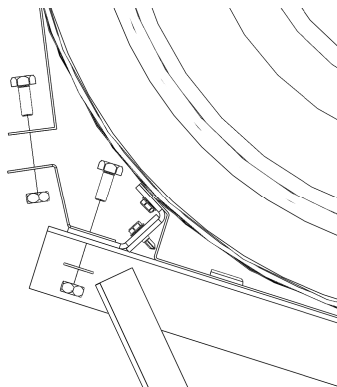
secure storage tank (with two flat feet)

- *Solar storage tank with flat base:*
 - Position the two tank clamps (343207) on the two outside A-frames with the shorter angled face of each clamp against the rear reinforcement plate. The hole in the longer angled face should be over the slotted hole at the top end of the A-frame.
 - Fix the tank clamp to the reinforcement plate with the Tek Screw 10G x 16 (080167).
 - **Note:** The tank clamps and 10G x 16 Tek screws are supplied in the Tank Frame Mounting Kit.



fix tank clamp to reinforcement plate

- Fix the Rear Bracket (short) Tank Strap (343203) to the tank clamp and A-frame using the screws, washers and nuts provided.
 - Ensure the foot of the Rear Bracket (short) Tank Strap is pointing inward toward the tank.
 - Use one washer (round 5/16" SS – 330354) under the nut.
 - **Note:** The Rear Bracket (short) Tank Strap is supplied in the Tank Frame Mounting Kit.
- Fix the foot of the Long Tank Strap to the other foot of the Rear Bracket (short) Tank Strap using the screws (348033) and nuts (330806) provided in the Tank Frame Mounting Kit.
 - Tighten the nuts and screws.



fix rear bracket tank strap and secure to the long tank strap

SYSTEM CERTIFICATIONS

The structural engineering analysis and design of this Fixed Pitch frame has been conducted and certified by the engineering firm Cardno (NSW) Pty Ltd.

The design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind actions
- AS / NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS / NZS 1664.1:1997 Aluminium structures Part 1: Limit design state
- AS 1720.1-1997 Timber structures Part 1: Design methods

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

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

Copies of each certification letter produced by Cardno (NSW) Pty Ltd are reproduced in the following pages.

The certification letter shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Our Ref: 605744-LO-43-008

Contact: Ryan Feller

8 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 008

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Edwards

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 180 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 007 Rev. 1 dated 15/09/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

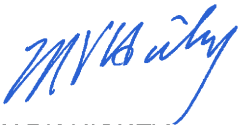
The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for Cardno (NSW)
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-43-016

Contact: Ryan Feller

8 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 016

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Edwards

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 180 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 016 Rev. 1 dated 15/09/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno (NSW)**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-43-017

Contact: Ryan Feller

8 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 017

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Edwards

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 305 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 015 Rev. 1 dated 15/09/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY

*Discipline Leader - Structures
for **Cardno (NSW)***

NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-49-053

Contact: Sukayna Aly

16 March 2011

Rheem Australia Pty Ltd
112 Pilbara St
WELSHPOOL WA 6106

Attention: Mr. Gary Gendall

Dear Gary,

RE: Solar Hot Water Support Frame No. 053

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Edwards

Product Description: 3 collector fixed pitch 17.5° anti-cyclone frame 305 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 053 Rev. 2 dated 02/01/2011

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. Dead and wind loads applied to the framing system as a result of the attachment of the water storage tank and collector panels have been considered.

It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-49-054

Contact: Sukayna Aly

16 March 2011

Rheem Australia Pty Ltd
112 Pilbara St
WELSHPOOL WA 6106

Attention: Mr. Gary Gendall

Dear Gary,

RE: Solar Hot Water Support Frame No. 054

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Edwards

Product Description: 3 collector fixed pitch 17.5° anti-cyclone frame 440 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 054 Rev. 2 dated 02/01/2011

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. Dead and wind loads applied to the framing system as a result of the attachment of the water storage tank and collector panels have been considered.

It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-49-056

Contact: Sukayna Aly

16 March 2011

Rheem Australia Pty Ltd
112 Pilbara St
WELSHPOOL WA 6106

Attention: Mr. Gary Gendall

Dear Gary,

RE: Solar Hot Water Support Frame No. 056

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Edwards

Product Description: 4 collector fixed pitch 17.5° anti-cyclone frame 440 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 056 Rev. 2 dated 02/01/2011

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. Dead and wind loads applied to the framing system as a result of the attachment of the water storage tank and collector panels have been considered.

It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-006

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 006

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Rheem

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 160 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 006 Rev. 1 dated 27/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for Cardno (NSW)
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-43-007

Contact: Ryan Feller

8 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPool WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 007

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Rheem Premier Hiline

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 180 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 007 Rev. 1 dated 15/09/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for Cardno (NSW)
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-014

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700

Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 014

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Rheem

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 300 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 014 Rev. 1 dated 30/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for Cardno (NSW)
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-43-015

Contact: Ryan Feller

8 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 015

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Rheem Premier Hiline

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 305 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 015 Rev. 1 dated 15/09/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno (NSW)**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-003

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 003

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 150 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 003 Rev. 1 dated 27/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno (NSW)**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-004

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 004

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 180 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 004 Rev. 1 dated 27/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno (NSW)**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-43-011

Contact: Ryan Feller

8 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 011

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 180 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 011 Rev. 1 dated 17/09/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for Cardno (NSW)
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-005

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 005

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 220 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 005 Rev. 1 dated 27/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for Cardno (NSW)
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-43-012

Contact: Ryan Feller

8 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPool WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 012

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 220 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 012 Rev. 1 dated 17/09/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY

*Discipline Leader - Structures
for Cardno (NSW)*

NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-013

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 013

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 300 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 013 Rev. 1 dated 30/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno (NSW)**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-48-050

Contact: Sukayna Aly

17 March 2011

Rheem Australia Pty Ltd
112 Pilbara St
WELSHPOOL WA 6106

Attention: Mr. Gary Gendall

Dear Gary,

RE: Solar Hot Water Support Frame No. 050

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 3 collector fixed pitch 17.5° anti-cyclone frame 300 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 050 Rev. 2 dated 02/01/2011

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-48-051

Contact: Sukayna Aly

17 March 2011

Rheem Australia Pty Ltd
112 Pilbara St
WELSHPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water Support Frame No. 051

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 3 collector fixed pitch 17.5° anti-cyclone frame 440 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 051 Rev. 2 dated 02/01/2011

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY

Discipline Leader - Structures

for **Cardno**

NT Certifying Engineer Reference # 32942ES

RPEQ # 01649

Our Ref: 605744-LO-48-055

Contact: Sukayna Aly

17 March 2011

Rheem Australia Pty Ltd
112 Pilbara St
WELSHPOOL WA 6106

Attention: Mr. Gary Gendall

Dear Gary,

RE: Solar Hot Water Support Frame No. 055

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Solahart

Product Description: 4 collector fixed pitch 17.5° anti-cyclone frame 440 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 055 Rev. 2 dated 02/01/2011

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY

Discipline Leader - Structures

for **Cardno**

NT Certifying Engineer Reference # 32942ES

RPEQ # 01649

Our Ref: 605744-LO-44-009

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 009

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Sunheat

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 160 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 006 Rev. 1 dated 27/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno (NSW)**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-010

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700

Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 010

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Sunheat

Product Description: 1 collector fixed pitch 17.5° anti-cyclone frame 180 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 010 Rev. 1 dated 27/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY

*Discipline Leader - Structures
for Cardno (NSW)*

NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-018

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPool WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 018

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Sunheat

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 300 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 014 Rev. 1 dated 30/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for Cardno (NSW)
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

Our Ref: 605744-LO-44-019

Contact: Ryan Feller

14 October 2010

Rheem Australia Pty Ltd
112 Pilbara St
WELSPOOL WA 6106

Attention: Mr. Gary Gendall

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Dear Gary,

RE: Solar Hot Water System Steel Framing System No. 019

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Sunheat

Product Description: 2 collector fixed pitch 17.5° anti-cyclone frame 300 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 019 Rev. 1 dated 30/08/2010

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate. No assessment has been made of any specific site as part of the design. No assessment has been made of any specific site as part of the design.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY

Discipline Leader - Structures

for **Cardno (NSW)**

NT Certifying Engineer Reference # 32942ES

RPEQ # 1649

Our Ref: 605744-LO-48-052

Contact: Sukayna Aly

17 March 2011

Rheem Australia Pty Ltd
112 Pilbara St
WELSHPOOL WA 6106

Attention: Mr. Gary Gendall

Dear Gary,

RE: Solar Hot Water Support Frame No. 052

The structural engineering analysis and design of the following solar hot water system support frame has been conducted by this firm:

Brand Name: Sunheat

Product Description: 3 collector fixed pitch 17.5° anti-cyclone frame 300 litre tank

Manufacturer's Name: Rheem Australia PTY LTD

Drawing No. 052 Rev. 2 dated 02/01/2011

We certify that this design is in accordance with normal engineering practice and principals 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 1170.2:2002 Structural design actions – Part 2: Wind Actions
- AS/NZS 4600:2005 Cold-formed steel structures
- AS 4100-1998 Steel structures
- AS/NZS 1664.1:1997 Aluminium structures Part 1: Limit state design
- AS 1720.1-1997 Timber structures Part 1: Design methods

The design of this support frame does not consider the effects of any snow or earthquake loading. In conjunction with AS/NZS 1170.2:2002 the frame has been designed to withstand wind loads up to and including region C, terrain category 2, installed at a maximum height of 10m (design wind speed 69.3m/s). This loading exceeds the requirements of Wind class N4/C2 when assessed in accordance with AS4055-2006 Wind loads for housing.

Cardno (NSW) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

To achieve the structural design capacity, it is essential that the steel frame structure be constructed in a strict accordance with the fixing details provided by the manufacturer's specification.

It is noted that this certification relates to the design of the framing systems only, and that no structural assessment of water storage tanks or collector panels has been conducted. It is further noted that verification of the roofs capacity to withstand any additional loads imposed by the solar hot water system is outside of the scope of this certificate.

This certificate shall not be construed as relieving any other party of their legal responsibilities or contractual obligations.

Yours faithfully,



MARK HICKEY
Discipline Leader - Structures
for **Cardno**
NT Certifying Engineer Reference # 32942ES
RPEQ # 01649

