IMAGINATION SOLAR LTD

Installation Guide A2

Roof Integrated Collectors

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A2.1 Roof integration of a vertical collector with ‘in-line’ tiles.
For staggered tiles and horizontal collectors the procedure is almost the same but see A2.3 and A2.4

STEP 1: Establish the collector position and remove tiles not required

1. Cut out the cardboard template from the collector box and use it to establish the visible edge of the collector. Allow at least 4cm on the top and side edges for recessing the collector under the tiles.

2. Remove the tiles where collector is to go. Ensure all battens are securely fixed using extra screws or nails as required (especially at collector edge).

3. Mark the proposed position of the collector on all 4 sides.

4. Mark the position of the holes to be made through the roof for solar pipes (and light sensor if applicable). Vertical collectors can be supplied with the pipes on the left or right edge. Ideally the holes should be just to the side of a joist, to preserve the integrity of the felt. If the holes will hit a rafter, readjust the proposed position.

Note: The collector is designed so that no tile cutting is required with most modern interlocking tile roofs. If the tiles do not fit to the dimensions of the collector, some tile cutting will be required. To ensure the minimum amount of tile cutting, align the collector with one vertical edge. Then adjust vertical position of collector for minimum tile cutting, whilst ensuring a good gradient onto tiles below. The top edge of tiles can often be adjusted by fitting a new higher batten for them to rest on at the appropriate height, rather than cutting them.

STEP 2: Fit supporting battens

1. Push back the top row of tiles and check for flatness of roof.

2. Fit a batten to take the weight of the top row of tiles as shown in figure 2. This will hold tiles just above top gutter of collector.

3. Check proposed position of holes through the roof as marked. Vertical collectors come with left and right side pipes so ensure you choose the correct side and avoid hitting a rafter.

4. Referring to figure 2 fit timber supports to support the bottom edge of the collector to support and nail the lead flashing into. This should be the same thickness as the roof battens or might be made up from a number of roof battens, as required.

5. Fit a feathered edge board on top of battens (e.g. tanalised fencing) as shown in figure 2, to prevent any sagging of the lead flashing when dressed down onto the tiles. It is essential that no gullies can form in the lead. Alternatively use a flat plank supported by a batten at the bottom to achieve the same effect.

STEP 3: Flash the bottom edge

1. Fit 300-400mm wide code 4 lead flashing along the bottom edge, securing at top with flat head, copper nails. Allow at least 80mm of lead to go underneath the collector and 80mm over tiles. Allow at least 150mm of lead to extend beyond the side edges of the collector. For vertical collectors a 1500 x 300mm length and for horizontal two lots of 1500 x 300mm (lapped joint) lengths of lead are usually enough. Confirm this with your own measurements.

2. Dress the lead over the tiles, double checking that no gullies could be formed. Turn side edges of the lead over 15mm to prevent side drift of water. Move collector into position for checking.

3. Score a straight line in the lead and fit the 2 supporting bottom ‘j’ clips for the collector (as shown in figure 2) through the lead, ensuring the bottom edge of the collector will be in the required location and level.
STEP 4: Mounting the collector

1. If a delta T controller is to be used, fit the PT1000 sensor to the collector first before proceeding further (as per guide B4).

2. Bring the collector up onto the roof horizontally, leaving it in its cardboard box as long as possible to minimise potential damage in handling. Two ropes, securely tied around either end of the box is usually sufficient to lift the collector onto a roof by two people.

3. Gently slide the collector down onto the bottom supporting brackets, being careful not to damage the back insulation.

4. Re-check the proposed position of the collector in relation to tiles. Note that you still have some scope for horizontal movement of the collector at this stage. When satisfied make holes for pipework and light sensor as per figure 10.

5. Tilt the bottom edge of the collector up slightly to push the flexible pipes through holes in felt whilst sliding the bottom edge of the collector into the ‘j’ clips.

6. Secure the top and sides of the collector, using the clips provided as shown in figures 2 - 5. It may be necessary to bend the clips to suit, especially for slate roofs. Vertical collectors should have 14 side clips (7 on each side) and 2 bottom clips, horizontal collectors have 6 side clips (3 on each side), 2 top clips and 4 bottom clips.

Do not attempt collector mounting in strong winds.

STEP 5: Refitting the tiles

1. Slide the tiles at the top of the collector back down onto the supporting batten, so that they are butted up to the top edge of the collector. If the tiles do not fit they will need to be cut to fit with an angle grinder (or slate cutters if slate).

2. Referring to figures 4 - 9 refit the tiles along the sides. Ensure the rubber seal is curved into the tile, not the collector. The rubber seal may be trimmed if necessary to ensure the tiles lie flat.

3. If the tiles are not a perfect fit, they will need to be cut using an angle grinder (see photos on back page). Ensure all tiles are butted up to the collector collector. Tiles with detail on their backs, may require grinding to allow them to lie flat onto the rubber seal.

4. Cut and trim the ends of the rubber seals so that the bottom tiles lie down and are sealed against the lead.

5. Ensure all tiles are lying flat and all tiles are secure and aligned with the edge of the collector leaving a 5-8mm expansion gap, thus forming a secret gutter.

6. Narrow, cut, tiles should be drilled and screwed down to the batten.

A2.2 Flashing options

- a) For profiled tile roofs and in exposed locations a lead flashing into the top gutter should be added for extra water tightness.

- b) In some cases it may be more convenient to mount the collector immediately below the ridge tiles, using a 300mm lead flashing under the ridge tile and into the collector gutter.

- c) It is recommended that patination oil be applied to all leadwork to improve ageing, appearance and reduce staining.
A2.3 Staggered tile installation
In staggered tile situations some cutting of tiles and grinding of detail on their backs, may be required to create a straight edge and flash the sides of the collector. This cutting is normally done with an angle grinder. This is demonstrated in the photos in guide A1.

A2.4 Roof Integration of a Horizontal Collector
Horizontal collectors are often preferred, especially if in-line tiles are not present, as they cut across less rows of tiles. There are also situations when only a horizontal collector will fit on a roof or provide the correct height for drain-back.

Installation is the same as for a vertical collector apart from 3 factors:

a) 4 ‘j’ clips are used to support the bottom edge of the collector.
b) Two overlapping sections of lead flashing must be connected using an overlapping welt joint on the bottom edge. Do not run a length of more than 1.6 m of lead as it may buckle in the sun.
c) The pipes to go through the roof are in the middle at the bottom of the collector. Not at the side as on a vertical collector.
d) It is crucial that the top gutter is completely flat or slightly convex in order to ensure water drains from the middle outwards, to the collectors edge.

A2.5 Variations for slate and plain tile roofs
The vertical edges of the collector have a 15mm lip to create a gully to channel rain water. Thus tiles resting on this lip (see figure 4) will be raised up at least this much (plus depth of rubber flap) from the battens. For most interlocking tiles this coincides with the thickness of the tiles and means they can be laid down flat on the collector edge. However, for some roofs this may cause the tiles to ‘kick up’ on the edge of the collector. To resolve this the following steps should be taken.

A2.6 Plain tiles and Gutter Extensions
To allow plain (un-profiled) tiles to lie flat against the collector edge, either cut the top corner out as shown in guide A1, or angle grind a groove where the gutter upstand is. Tile and a half’s may be required in some cases for small plain tiles. Plain concrete interlocking tiles will look better if the interlock profile can be removed to leave a smooth continuous edge. Sometimes a side gutter extension may be useful to extend the collector width to a convenient dimension, as shown in figure 6.
**A2.7 Slates and Slate Gutter Profile**

For slate roofs, the collector may be recessed into the roof by approximately 20mm to allow the slates to lie flush onto the rubber seal and not kick up. Cut and remove the battens behind the proposed collector location and support the collector from below using noggings. It may be best to align one edge of the collector with the middle of a rafter, depending on rafter spacing, to minimise work.

1. If there is sufficient depth, fit a sheet of AWB plywood (at least 12mm) to the rafters, on top of the roof felt. The thickness of plywood must be chosen so as to ensure a flush fit of the collector to the tiles. The plywood must fully support the side edges of the collector. Use noggings to support the plywood if it is hanging between two rafters.

2. If there is insufficient depth for even a 12mm sheet of plywood then use noggings between rafters to support the side edges of the collector or extend the width of rafters with timber (100x50mm). The noggings must be fitted from inside the roof space so as not to damage the roof felt. There is no need to support the top edge as the collector will be resting on the rafters. Noggings on the bottom edge must be arranged so as to support the lead flashing. The bottom edge must be supported as this holds up the lead flashing.

3. Ensure any battens that have been cut are fully supported. Noggings will be required to support any that have been cut between rafters. Fix metal clips either to rafters or nogging, not unsupported battens or thin plywood wherever possible.

4. Take a supply of slate hooks to make good inaccessible loose slates. These allow slates to be fixed without removing the slates above.

Alternatively some installers prefer to mount the collector on top of the battens and use a slate gutter profile as shown in figures 8 and 9.

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**A2 Figure 1:** Timber support for recessed collector in a slate roof
A2.8 Double Roman Tiles
The ISL collectors are designed so that they are exact multiples of modern double roman tiles and so no tile cutting should be needed. However, if this is not the case or another style of ‘wave’ profile tile is found then extra planning is needed. Before cutting commences it is important to check that both sides of the collector meet with a rise in the tile profile to guarantee that the tile overlaps the collector gutter. If this is not the case then a gutter extension can be used to ensure that the collector is the correct width to meet tile rises on both sides, as shown in figure 6.

A2.9 Installation Detail

**A2 Figure 2:** Cross section of collector flashing and support for top and bottom edge.

**A2 Figure 3:** Securing the sides of the collector, showing gutter and rubber seal.
rubber seal curled into tile
stainless steel clip
stainless steel wood screws

A2 Figure 4: Tile roof side detail.

Trimmed rubber seal
Bend clips to fit panel on slate roof

A2 Figure 5: Slate roof side detail.

A2 Figure 6: A gutter extension can be supplied to extend the collector to a convenient width

A2 Figure 7: Gutter extension dimensions
A2 Figure 8: Cross-section of slate roof with slate gutter profile

A2 Figure 9: Slate gutter profile dimensions

A2 Figure 10: Detail of holes through roof for pipes (and light sensor in middle if required).

A2.10 Roof integrating two or more collectors

Two collectors may be installed separately with one or more columns of tiles between them or mounted side by side and flashed between in suitable manner. However if collectors are to be butted together side-by-side then a vertical joining strip can be supplied to join two vertical collectors (see figure 11). This strip is not recommended for use with horizontal collectors. See section A2.11 (Notes) below.

The joining strip is both a cover and a side edge fixing, replacing the side brackets.

For aesthetic reasons you may find it desirable to order a special black powder coated version.
A2 Figure 11: Details of joining strip for installing two adjacent vertical collectors

If collectors are to be mounted one above the other then a sufficient gap should be left in between the collectors for a downward sloping flashing to be fitted in a similar fashion to that shown in figure 2. However this is not recommended for hydraulic reasons in a drainback system and so antifreeze would be required to be maintained.

A2.11 Notes:
Two horizontal collectors butted together is not recommended, since there is twice as much water trying to get down the gutters compared with two vertical collectors and so water may back up and seep under the collectors at the top edge.

If you are going to do it then it is important to flash the top edge, as shown in the photograph below of an ISL installation. Key points are:

1. Space collectors as far apart as possible, such that gutter is not blocked by joining profile.
2. Flash over joining profile with a T shaped tongue of lead, which extends upwards under tiles and downwards over joining profile. (dressed well down into the top gutter)
3. Use a lead flashing over the entire top edge and turn this upwards to height of collector surface.
4. Cut out spout where collectors meet and dress down lead.
5. This technique should also be used with vertical panels in high exposure locations.
6. If required we can also supply an extra narrow joining profile, which will maximize the available gutter volume.

A2 Figure 12: 2 Horizontal collectors - flashing detail
A2 Figure 13: Example flashing