INDAX 250 PV SYSTEM

Installation Instructions for Redland InDaX 250 PV System

Version: 3
Date: January 2014
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1 INTRODUCTION

It is highly recommended that you read all the guidance and installation notes before starting the installation to ensure that the Redland InDaX 250 PV System is installed safely.

1.1 HEALTH & SAFETY

1.1.1 GENERAL GUIDANCE

- Ensure the most up to date Construction (Design and Management) Regulations (CDM) and general construction site training are followed.
- Any person handling PV panels should be trained in correct manual handling practice. Please note also that PV panels can have sharp edges and so appropriate safety gloves should be worn when handling panels.
- All appropriate Health and Safety regulations should be followed correctly.
- Avoid installing the system in poor weather conditions, including strong wind, rain, ice or snow.
- Do NOT walk on the PV panels at any time.
- The slating and tiling should be carried out in accordance with the current version of British Standard BS 5534, Code of practice for slating and tiling (including shingles) and current Redland InDaX 250 PV System fixing instructions.
- Install all components as specified within this guide to ensure weathertightness and wind uplift security.

1.1.2 ELECTRICAL HAZARDS

Photovoltaic (PV) panels do not present a risk as long as appropriate safety practices are followed at all times during installation. In particular, you must be aware of the following:

- PV panels produce a DC voltage whenever exposed to daylight. This voltage cannot be switched off.
- All work must be carried out with the system disconnected from the main electrical supply.
- PV panels are pre-wired with insulated connectors to prevent an electrical shock during general handling. However, care must be taken not to cut or damage the PV panel cable insulation or expose bare wire.
- Ensure all PV panel cable connectors are dry and free of dirt before making connections.
- Ensure no PV panel cable ends are left exposed to the weather during pauses in the work schedule or after completion of the works.
- It is strongly recommended that the PV installation is installed in accordance with the following publication “Photovoltaics in Buildings – Guide to the installation of PV systems”.
- The AC side of the installation needs to be connected in accordance with the appropriate Energy Networks Association’s standards, G83 or G59, depending upon the size / number of the installation(s). Contact the appropriate electrical District Network Operator (DNO) for further details.
- The installation must comply with BS7671 (current edition) – Requirements for Electrical Installations.
1.1.3 INSTALLATION PREPARATION

Follow the guidance below to ensure the Redland PV panels are installed and handled correctly:

- Use this installation guide alongside your PV panel layout and circuit diagram to determine the location and layout of the Redland Solar PV panels and associated PV panel cables on the roof.
- Keep the Redland PV panels in a weatherproof environment prior to installation.
- Carry the Redland PV panels with both hands by the frame, avoiding touching or scratching the face of the panels.
- Only load as many Redland PV panels onto the roof as you expect to install during the work session.
- Secure or remove any uninstalled PV panels before leaving the roof to avoid possible wind damage or theft.
- Do not leave tools or unsecured materials above the Redland PV panel installation area, to avoid potential damage to the PV panels.

1.2 EQUIPMENT REQUIRED

- Screwdriver or hand-held power screwdriver with pozi-drive head for fixing the screws that secure the panel fixing boards to the rafters, and with star-drive head for fixing the screws (with washers) that secure the InDaX 250 PV panels to the panel fixing boards.
- Voltmeter to check PV panel cable connections (Note: It is recommended to test the voltage across every four connected PV panels as the installation proceeds to check the integrity of the PV panels and their electrical connections).
2 PRELIMINARIES

2.1 CIRCUIT DIAGRAM & LAYOUT

Before starting please check the circuit diagram to confirm the required layout of the PV panel array and the associated electrical connections between PV panels and also back to the DC/AC Inverter. Redland InDaX 250 PV panels are connected electrically in series, which is called a string, with each string having its own connections back to the inverter. The PV panel connectors and cables provided must be used for the series connection of the PV panels. PV panels come with pre-wired connectors for panel-to-panel connections. Additional PV panel 10 m cables are available for panel-to-inverter connections.

For Redland InDaX 250 PV panels, the recommended direction of cabling within a string is in rows, from right to left, then left to right in the row above, and then right to left again, and so on as you work across the PV array. The pre-wired connectors attached to the PV panels should be used for all the electrical connections between panels. The 10 m cables should be used to connect the first and last PV panels in the string to the inverter. As a rule of thumb, the 10m cables should be long enough for the connections to the inverter for PV panel arrays up to four columns of PV panels wide; for wider PV panel arrays it may be necessary to use longer inverter cables. Monier Redland Limited can supply additional 10m inverter cables if required.

Note that for all electrical connections, the pre-wired connectors and cables are used to connect from the +ve terminal to the −ve terminal of each consecutive PV modules in each string.

Additional strings of PV panels connected in electrical series can be connected to the inverter using the other sets of +ve and −ve inputs available on the inverter. Note the maximum number of PV panels that can be connected to the inverter is limited by the capacity of the inverter. If two or more strings are connected to the same inverter, then each string must contain the same number of modules, and they must have the same pitch and orientation. Refer to the inverter literature for further details. Always ensure that the inverter specified has sufficient capacity for the size of the array being connected. For large arrays, more than one inverter may be required.
2.2 COMPONENTS

Additional Middle Top and Apron Flashings are also available, for PV arrays that have more than two Redland InDaX 250 PV panels in a row.
2.3 SETTING OUT

To make sure the PV panel array is installed in the correct position of the roof, it is recommended that you first mark out the area where the PV panels are to go before you begin. It is also recommended that the position of the inverter(s) within the building in relation to the PV array is (are) identified.

Care must be taken when setting out the system, measurements need to be accurate or the panels may be difficult to fit. Familiarise yourself with the steps involved before starting work.

This system is suitable for both retro-fitting into existing roofs and new build roofs. Read the setting out diagrams below in conjunction with the instructions in the later sections for a clear understanding of the work steps involved.

2.3.1 Setting Out For Existing Roofs

Locate the position of the panel array on your roof and remove the roof tiles. From the edge of the roof tiles on the right hand side make a mark 65 mm away, this will be the starting point for the trim. Note these roof tiles will still need to be removed so the flashing can be installed.
2.3.2 Setting Out For New Build Roofs

Setting out is the same as for retro-fitting although you can just position the roof tiles to the right of the panel, mark the left hand edge of the tile and strike a line up the roof on the battens and take your 65 mm mark from this line as per previous instruction.

Once you have marked the 65 mm line away from the edge of first roof tile you should mark out for the panels and centre joining channels as per the diagram above, finishing with another 65 mm mark for the left hand flashing.

You then need to install the panel fixing boards. Setting out instructions are as per the diagram below. The boards are to be 150-165 mm wide x 25 mm deep and should be treated timber with minimum strength class C16/C18/C20/TR20/C22 in accordance with the current version of BS EN 1995-1-1: Eurocode 5. Design of Timber Structures. General. Common rules and rules for buildings.
Firstly strike a line 70 mm above the very top of the roof tiles below the bottom PV panel position. This line will coincide with the bottom of the lower fixing board.
For rafter centres up to 600mm spacing secure fixing board using the 100 mm x 5mm wood screws provided as follows: at each rafter intersection use three screws. Due to the length and diameter of the screws it is recommended that pilot holes be drilled first using a suitably sized drill bit before the screws are driven into the timber. For rafter centres greater than 600mm please contact Redland Technical Solutions on Tel. 08708 702595.
2.3.3 Installation of the Flashing Kit

i. Make a mark 70 mm above the head of the tiles at both ends of the array for the fixing board, the bottom edge of the fixing board will coincide with this line. Remove any tiling battens that coincide with the fixing board. (this only applies to 165 mm boards).

ii. With the tiling battens removed install the bottom board and cut it so that the board ends on the rafter nearest the outside of the panel array. Cut the board so that it is positioned halfway on to the rafter, leaving the other half to fix the tiling battens to if required. Drill pilot holes through boards and into rafter, then secure the boards using screws supplied - three screws per rafter.
iii. Photo showing lines that mark out position of Left Hand Flashing. The central upstand in Left Hand Flashing (where tiling starts/finishes) is 65 mm away from left hand edge of Left Hand Flashing.

iv. Drill pilot holes and secure board to all rafters with screws supplied. Three fixings per rafter.

v. The distance between the top of the bottom board and the top of the top board is 1705 mm. For subsequent panels in the column additional boards can be fitted in increments of 1705 mm. (see fitting diagrams).
vi. This picture shows the boards fitted and ready for the flashing kit for a two wide x one panel high PV array. For additional panels up the roof you will need to install more boards as above.

vii. Install the panel head clamps with screws provided. Bottom of clamp must be on the line as shown.

viii. Secure clamp to board using all 4 screws provided.

ix. Head clamps installed, leaving the 55 mm gap between for joining channel.
x. Install side flashings, making sure to line up the bottom edge of the flashing with the reference line marked 50 mm up from bottom edge of board (see fitting diagrams).

xi. Use clips provided to secure flashing components.
xii. Slide joining channel under the panel head clamps and position on 50 mm reference line as shown. (The joining channels are tapered, the thinner end should be positioned at the bottom).

xiii. Use the clips to secure joining channel in position.
xiv. A tack or screw can be used to secure the top of the joining channel.

xv. This picture shows the panel head clamps, joining channel, and side flashings installed and clipped.

xvi. Position the top flashings and ensure that the leading edge is engaged fully with the bottom edge of the head fixing clamp, normally this is achieved by pushing the flashing firmly into the head clamp until it clicks into place.
When engaged fully secure the top flashing using the screws and washers provided.

For top corner flashings ensure two screws and washers are used to mechanically fix the sides of the flashing, at the top and bottom. It is important that the screws are located behind the foam as shown to ensure weathertightness of the system. Depending on the roof tiling batten gauge additional short battens maybe required to provide fixing points for the screw-fixing of the sides of corner flashings, at the top and bottom as shown.

Two additional screws and washers are required for corner flashings and all other top flashing units at the top edge of the flashing behind the foam; these screws should be spaced evenly apart to secure the top edge of the flashing as shown.

(Note: Depending on the roof tiling batten gauge an additional batten maybe required to be installed to provide fixing points for the top edge screws. If required the top edge of this batten will be located 550 mm up from the bottom of the top fixing board (measured up the rafter). The adjacent photo shows the top flashing at the corner installed correctly with tilt fillets installed. (Note: tilt fillets should be used to support tiles when required).
xix. Position bottom apron flashings ensuring the fold (shown in picture directly below bottom edge of white tape) is in line with the 50 mm reference line.

xx. Install bottom aprons and clip as the rest of the flashings.

xxi. Boards and flashings installed and ready to tile round.
### 2.4 RAFTER PITCHES

For the tiles detailed in the table below, follow the appropriate PV panel installation instructions in following sections. Note that the minimum and maximum rafter pitch for use of the Redland InDaX 250 PV system with the various roof tiles in the Redland Range above is shown in the table below:

<table>
<thead>
<tr>
<th>ROOF TILE</th>
<th>RAFTER PITCH° (MIN - MAX)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Slate (500 x 250 mm)</td>
<td>25° - 65</td>
</tr>
<tr>
<td>Cambrian Slate</td>
<td>15 - 65</td>
</tr>
<tr>
<td>Landmark Slate 10 ®</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Richmond 10 ®</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Saxon 10 ®</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Mockbond Richmond 10 ®</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Mini Stonewold ®</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Mockbond Mini Stonewold ®</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Stonewold II ®</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Fontenelle ®</td>
<td>20° - 65</td>
</tr>
<tr>
<td>Landmark Double Pantile</td>
<td>15 - 65</td>
</tr>
<tr>
<td>Landmark Double Roman</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>Grovebury</td>
<td>15° - 65</td>
</tr>
<tr>
<td>50 Double Roman</td>
<td>17.5° - 65</td>
</tr>
<tr>
<td>Regent</td>
<td>12.5° - 65</td>
</tr>
<tr>
<td>Renown</td>
<td>17.5° - 65</td>
</tr>
<tr>
<td>Norfolk Pantile</td>
<td>17.5 - 65</td>
</tr>
<tr>
<td>49 Tile</td>
<td>17.5° - 65</td>
</tr>
<tr>
<td>Old Hollow Clay Pantile</td>
<td>30 - 65</td>
</tr>
<tr>
<td>Cathedral Clay Pantile</td>
<td>22.5 - 65</td>
</tr>
<tr>
<td>Postel</td>
<td>20 - 65</td>
</tr>
<tr>
<td>Plain Tiles (incl. Rosemary Clay Plain Tiles)</td>
<td>35 - 65</td>
</tr>
<tr>
<td>DuoPlain ®</td>
<td>25 - 65</td>
</tr>
</tbody>
</table>
* Where wind-driven rain is < 56.5 l/m² per spell (Moderate exposure, BS 5534:2003) and rafter length is ≤ 9m.
* The min. rafter pitch can be decreased to 15° when used with Spirtech 400 2S underlay in the counties of Bedfordshire, Berkshire, Buckinghamshire, Cambridgeshire, Derbyshire, Essex, Hertfordshire, Kent, Leicestershire, Lincolnshire, Greater London, Norfolk, Northamptonshire, Nottinghamshire, Oxfordshire, Staffordshire, Suffolk, Surrey, Warwickshire, West Midlands, East Yorkshire and South Yorkshire, and on single storey lean-to roofs anywhere in the United Kingdom.
* Through coloured tiles only.
* The minimum pitch for this roof tile is based on a maximum rafter length of 10 m. For rafter lengths greater than this, please contact the Technical Solutions Hotline on 08708 702595.

2.5 FIXING

The fixing instructions in the following sections are those that apply where the supporting rafters/frame or tiling batten supports are spaced at no more than 600mm centres and the tiling battens used are 50 x 25 mm (38 x 25 mm for Plain Tiles, incl. Rosemary Clay Plain Tiles) in dimension. For other configurations please contact Redland Technical Solutions (Tel. 08708 702595) for advice before proceeding.

Please note that in all cases the perimeter slates/tiles adjacent to the PV panel array must be screw-fixed in each and every nail-hole as detailed in the following sections of these fixing instructions. Additional tail clipping/fixing may also be required as described in the section relevant to the roof covering being used. The only exception is centre-nailed Natural Slate which can be fixed in the standard way with two nail fixings. For all other tiles in the roof the tiles must be fixed in accordance in accordance with current version of BS 5534, Code of practice for slating and tiling. Redland can supply a BS 5534-compliant fixing specification upon request.

2.6 INSTALLATION

Note that all Redland InDaX 250 PV panels are integrated with the slates/tiles using the flashings provided (see instructions below). Redland InDaX 250 PV panels are designed to integrate with at least one slate or tile at the perimeter of the PV panel array to ensure weathertightness of the installation. The modular design of the flashings and PV panels also facilitates easy installation of the PV array since the design lends itself to the flashings being installed first and the panels installed subsequently. Once the flashings are installed, the PV panels are laid in the flashing array from top to bottom which also avoids the manual handling of panels over panels.
3 FLAT INTERLOCKING ROOF TILES (LANDMARK SLATE 10, RICHMOND 10, SAXON 10, MOCKBOND RICHMOND 10, MINI STONEWOLD, MOCKBOND MINI STONEWOLD, STONEWOLD II, FONTENELLE)

It is important to note that the instructions below relate to the PV panel array and any special detailing for the tiles required around the array. Everywhere else the BS 5534-compliant fixing specification for the flat interlocking roof tile (Landmark Slate 10, Richmond 10, Saxon 10, Mockbond Richmond 10, Mini Stonewold, Mockbond Mini Stonewold, Stonewold II, Fontenelle) should be followed.

i. Install the tiles in the course below the bottom apron and screw them in place. Screw fix the tiles at the side of the flashing to complete the tiling, cutting the tiles if necessary. It may be necessary to slightly flatten the flange on the trim and remove some of the tile nib to reduce the tiles kicking up. For Landmark Slate 10, Richmond 10, Saxon 10 and Mockbond Richmond 10 tiles use 38 x 4.2 mm countersunk pozi-drive stainless steel screws (9104). For Mini Stonewold, Mockbond Mini Stonewold, and Stonewold II tiles use 50 x 3 mm countersunk pozi-drive stainless steel screws. For Fontenelle use 50 x 4.2 mm countersunk pozi-drive stainless steel screws (9366).
ii.  Continue tiling up both Left Hand and Right Hand Flashings ensuring tiles immediately adjacent to the flashings are screw-fixed.

iii. The tiles at the top corners will need to be cut. The size and shape of the cut will be depend on the batten gauge and tile spacing.
iv. An adhesive foam strip is available to close up any gaps created by cutting of any tiles.

v. At the top flashing cut the bottom of the tiles enough so that the tile sits in the same plane as the adjacent tile. Screw-fix the top course of tiles in each and every nail-hole.

vi. Picture showing the tiles cut and screw fixed around the PV Flashings ready for PV Panels.
vii. Locate the edge of the panel into the joining channel and the edge of the flashing unit, slide the panel up until it clicks and engages into the panel head clamp. **The panel is fully engaged when 25mm of PV panel frame is exposed below the panel head clamp.** Check that this is the case. If less than this is observed the top flashing unit is likely to not be fully engaged on the panel head clamp. It is essential that the top flashing unit is fully engaged.

viii. Lay the panel flat and the bottom edge should be in line with the fold in the front apron.
ix. Fix the panel with four screws and washers provided.

x. Remove the backing paper from the adhesive strip on the underside of the apron and stick it to the tiles - ensuring the tiles are clean and dry, and free from dust. Some dressing maybe necessary. If tiles are damp or wet a continuous bead of Redland Rapid Flashing M-Glue (9929) should be applied first to the tile surface where the butyl adhesive strip is to be fixed before dressing the flashing down.

xi. Picture shows the finished PV array.
The step-by-step instructions above show how the Redland InDaX 250 PV Panels are installed in a row. When installing in a column the panels interlock with each other head to tail as described in instructions below

i. For arrays with columns of more than one panel it is necessary to install a panel head clamp for each additional panel. The distance from the top of each board is 1705 mm with a 50 mm reference line marked from the bottom of the board. (See fitting diagrams).

ii. The next step is to insert the PV panels from top to bottom. Install the top panel into the panel head clamps at the top of the PV array.

   The panel is fully engaged when 25mm of PV panel frame is exposed below the panel head clamp. Check that this is the case. If less than this is observed the top flashing unit is likely to not be fully engaged on the panel head clamp. It is essential that the top flashing unit is fully engaged.

   Secure the bottom of the top PV panel using 4 screws and washers provided into the board.
iii. Insert the top of the next panel down in the column into the bottom of the panel above. Push the panel up as far as it will go and then secure the panel again using four screws and washers provided into the board below; the panel is fully engaged when 25mm of PV panel frame is exposed. Carry on as required for all the panels in the column until you finish with the very bottom panel above the apron flashing.

iv. Secure the very bottom panel of the array using the four screws and washers provided into the bottom board as shown.
v. Finished installation of InDaX 250 PV Panels in column.
4 NATURAL SLATE (500 x 250 mm)

*It is important to note that the instructions below relate to the PV panel array and any special detailing for the slates required around the array. Everywhere else on the roof the BS 5534-compliant fixing specification for Natural Slate should be followed.*

i. Install the slates below the panel as normal, the apron may need lifting slightly to get them in.

ii. Photo showing slates below the flashings.
iii. Carry on slating on the next course as normal, flatten down the apron if required to prevent the slates from rocking or kicking up. Some slates may need to be re-holed as not to put a nail through the flashing.

iv. Continue slating using slate and a half’s as normal, you may need to flatten the small up-stand on the flashing in places.
v. Picture shows the left hand side finished.

vi. The tiles at the top corners will need to be cut, and a short course installed, the size and shape of the cut will be depend on the batten gauge and tile spacing.

vii. Slate across the top of the panel.
viii. Flashings and slating completed.

ix. Locate the edge of the panel into the joining channel and the edge of the flashing unit, slide the panel up until it clicks and engages into the panel head clamp.

The panel is fully engaged when 25mm of PV panel frame is exposed below the panel head clamp. Check that this is the case. If less than this is observed the top flashing unit is likely to not be fully engaged on the panel head clamp. It is essential that the top flashing unit is fully engaged.

x. Lay the panel flat and the bottom edge should be in line with the fold in the front apron. Fix the panel with the four screws and washers provided.
xi. Remove the backing paper from the adhesive strip on the underside of the apron. Ensure the tiles are clean and dry, and free from dust. Apply a continuous bead of Redland Rapid Flashing M-Glue (9929) to the slate surface where the butyl adhesive strip is to be fixed. Push the flashing down ensuring the butyl strip makes good contact with the M-Glue. Some dressing maybe necessary.

xii. Picture shows the finished PV array.
5 CAMBRIAN SLATE

It is important to note that the instructions below relate to the PV panel array and any special detailing for the slates required around the array. Everywhere else on the roof the standard BS 5534-compliant fixing specification for Cambrian Slate should be followed.

i. Install the slates in the course below the bottom PV tile. The Cambrian Slates around the flashings need to be screwed using 30 x 3.5 mm countersunk pozi-drive stainless steel screws ensuring each standard slate is twice-screwed and clipped.

ii. Cambrian Verge clips (9193) will be required every course both sides. The first one is nailed into the board as shown.
iii. The Cambrian Slates around the flashings need to be screwed as shown. Use 30 x 3.5 mm countersunk pozi-drive stainless steel screws ensuring each standard slate is twice-screwed and clipped.

iv. Continue slating using slate and half’s and verge clips.
v. The top corner slate may need cutting, the cut will depend on the batten gauge.

vi. A short course maybe required at the top, if so it must be screw fixed in place.

vii. If a full course of slates exists at the top in addition to screws at the head of the slates short lengths (minimum two per slate) of Cambrian butyl strip (9554) must be firmly adhered between the underside of the Cambrian Slate and the top flashing (just behind the weather bars on the leading edge of the Cambrian Slate) to provide a tail-fixing for the slates over the flashing. Ensure the tails of the slates are adhered well to the butyl strip by pressing down tightly.
viii. A batten can be installed to accept the verge clip where the board has been cut back. This clip is for the first slate next to the flashing. Install this clip as low as possible. See next picture.

ix. Screw-fix first slate next to flashing in place to ensure three-point fixing (i.e. two screws and verge clip).
x. This picture shows the verge clips installed and the short course through the top of the panel.

xi. Flashings and tiling completed.

xii. Locate the edge of the panel into the joining channel and the edge of the flashing unit, slide the panel up until it clicks and engages into the panel head clamp. The panel is fully engaged when 25mm of PV panel frame is exposed below the panel head clamp. Check that this is the case. If less than this is observed the top flashing unit is likely to not be fully engaged on the panel head clamp. It is essential that the top flashing unit is fully engaged.
xiii. Lay the panel flat and the bottom edge should be in line with the fold in the front apron. Fix the panel with the four screws and washers provided.

![Screws and Washers](image)

xiv. Remove the backing paper from the adhesive strip on the underside of the apron. Ensure the tiles are clean and dry, and free from dust. Apply a continuous bead of Redland Rapid Flashing M-Glue (9929) to the slate surface where the butyl adhesive strip is to be fixed. Push the flashing down ensuring the butyl strip makes good contact with the M-Glue. Some dressing maybe necessary.

![Flash Adhesive Application](image)

xv. Picture shows the finished PV array.

![Finished PV Array](image)
6 PROFILING INTERLOCKING ROOF TILES (49 TILE, 50 DOUBLE ROMAN, CATHEDRAL CLAY PANTILE, GROVEBURY, LANDMARK DOUBLE PANTILE, LANDMARK DOUBLE ROMAN, NORFOLK PANTILE, OLD HOLLOW CLAY PANTILE, POSTEL, REGENT, RENOWN)

It is important to note that the instructions below relate to the PV panel array and any special detailing required for the tiles around the array. Everywhere else the BS 5534-compliant fixing specification for the profiled interlocking roof tile (49 Tile, 50 Double Roman, Cathedral Clay Pantile, Grovebury, Landmark Double Pantile, Landmark Double Roman, Norfolk Pantile, Old Hollow Clay Pantile, Postel, Regent, Renown) should be followed.

i. Install the tiles in the course below the apron flashing and screw them. Cut (if necessary) and screw the tiles at the side flashings to complete the tiling. It may be necessary to flatten the outer flange on the trim and remove the tile nibs to reduce the tiles kicking up. Through the normal nail-hole use 70 x 4 mm countersunk pozi-drive stainless steel screws for Landmark Double Pantile, Grovebury, Regent tiles. Use 60 x 4 mm screws for Landmark Double Roman, 50 Double Roman, 49 tiles, and Cathedral Clay Pantile. Use 50 x 3 mm screws for Renown, Norfolk Pantile and Old Hollow Clay Pantile. Use 38 x 4.2 mm screws (9104) for Postel.
ii. The tiles at the top corners will need to be cut, the size and shape of the cut will be depend on the batten gauge and tile spacing.

iii. At the top flashing cut the bottom of the tiles enough so that the tile sits in the same plane as the adjacent tile. Ensure that tiles sit upon and squash foam down below the tiles.

iv. All tiles around the flashings must be screwed.
v. Picture showing top left hand corner cut.

vi. Picture showing the tiles cut and screw fixed around the PV Flashings ready for PV Panels.

vii. Locate the edge of the panel into the joining channel and the edge of the flashing unit, slide the panel up until it clicks and engages into the panel head clamp. The panel is fully engaged when 25mm of PV panel frame is exposed below the panel head clamp. Check that this is the case. If less than this is observed the top flashing unit is likely to not be fully engaged on the panel head clamp. It is essential that the top flashing unit is fully engaged.
viii. Lay the panel flat and the bottom edge should be in line with the fold in the front apron.

ix. Fix the panel with four screws and washers provided.
x. Remove the backing paper from the adhesive strip on the underside of the apron and stick it to the tiles, ensuring the tiles are clean and dry, and free from dust. Some dressing maybe necessary. If tiles are damp or wet a continuous bead of Redland Rapid Flashing M-Glue (9929) should be applied first to the tile surface where the butyl adhesive strip is to be fixed before dressing the flashing down.

xi. Picture shows the finished PV array.
It is important to note that the instructions below relate to the PV panel array and any special detailing required for the tiles around the array. Everywhere else the BS 5534-compliant fixing specification for the Plain Tiles (incl. Rosemary Clay Plain Tiles) should be followed.

i. Install the tiles in the course below the bottom apron and screw them, then cut (if necessary) and screw the tiles at the side of the flashing to complete the tiling. Use 38 x 4.2 mm countersunk pozi-drive stainless steel screws (9104).

ii. It may be necessary to slightly flatten the flange on the trim and remove some of the tile nib to reduce the tiles kicking up.
iii. Some tiles may need drilling to avoid putting a screw through the flashing.

iv. Continue the tiles across the top of the flashing in the normal manner.

v. The plain tiles can be fixed by screwing through the trim, but the fixings must be above the foam.
vi. Flashings and tiling completed.

vii. Locate the edge of the panel into the joining channel and the edge of the flashing unit, slide the panel up until it clicks and engages into the panel head clamp. The panel is fully engaged when 25mm of PV panel frame is exposed below the panel head clamp. Check that this is the case. If less than this is observed the top flashing unit is likely to not be fully engaged on the panel head clamp. It is essential that the top flashing unit is fully engaged.

viii. Lay the panel flat and the bottom edge should be in line with the fold in the front apron.
ix. Fix the panel with the four screws and washers provided.

x. Remove the backing paper from the adhesive strip on the underside of the apron and stick it to the tiles, ensuring the tiles are clean and dry, and free from dust. Some dressing maybe necessary. If tiles are damp or wet a continuous bead of Redland Rapid Flashing M-Glue (9929) should be applied first to the tile surface where the butyl adhesive strip is to be fixed before dressing the flashing down.

xi. Picture shows the finished PV array.
It is important to note that the instructions below relate to the PV panel array and any special detailing required for the tiles around the array. Everywhere else the BS 5534-compliant fixing specifications for DuoPlain Tiles should be followed.

i. Install the tiles in the course below the bottom apron and screw them, then cut (if necessary) and screw the tiles at the side of the flashing to complete the tiling. It may be necessary to slightly flatten the flange on the trim and remove some of the tile nib to reduce the tiles kicking up. Use 38 x 4.2 mm countersunk pozi-drive stainless steel screws (9104).

ii. Continue tiling around the edges of the Left Hand and Right Hand Flashings ensuring the tiles immediately adjacent are screw-fixed.
iii. Continue tiling in the normal manner to the top of the flashing.

iv. Cut the tiles if necessary to the left of the flashing and secure with screws.
v. Tile across the top of the back flashing screwing the tiles.

vi. Picture showing the tiles cut and screw fixed around the PV Flashings ready for PV Panels.

vii. Locate the edge of the panel into the joining channel and the edge of the flashing unit, slide the panel up until it clicks and engages into the panel head clamp. The panel is fully engaged when 25mm of PV panel frame is exposed below the panel head clamp. Check that this is the case. If less than this is observed the top flashing unit is likely to not be fully engaged on the panel head clamp. It is essential that the top flashing unit is fully engaged.
viii. Lay the panel flat and the bottom edge should be in line with the fold in the front apron.

ix. Fix the panel with the four screws and washers provided.
x. Remove the backing paper from the adhesive strip on the underside of the apron and stick it to the tiles, ensuring the tiles are clean and dry, and free from dust. Some dressing maybe necessary. If tiles are damp or wet a continuous bead of Redland Rapid Flashing M-Glue (9929) should be applied first to the tile surface where the butyl adhesive strip is to be fixed before dressing the flashing down.

xi. Picture shows the finished PV array.
9 CONNECTIONS TO INVERTER

For safety reasons it is very important that the electrical connections from the inverter to the PV panel array are made as per the following instructions.

Typically the inverter is located within the roof sub-structure (e.g. loft space) in the immediate proximity of the PV panel array so as to keep the length of cable on the DC side of the system to a minimum. The cabling from the inverter to the PV panel array inside the roof structure must be properly secured throughout its length using clips or cable ties as appropriate, and labelled correctly (Danger – Solar PV Array Cable, High Voltage D.C. – Live During Daylight). The inverter should be mounted in accordance with inverter installation instructions. Typically, these state that the inverter must be mounted vertically on a wall or a non-combustible board fixed secured to the building / roof structure and in a location that is easily accessible for inspection and testing.

A DC switch should always be installed between the PV panel array and the inverter. Many inverters contain an integrated DC switch but it is possible that your inverter may not have an integrated switch. Check the technical specifications of the inverter and local regulations before installation.

The electrical installation of the PV modules must be as per the circuit diagram. The pre-wired +ve and –ve connections allow for ease of connection between consecutive modules, and for final connection into the DC inputs of the inverter. Below is a guide to how these electrical connections are made:

i. The 10 m cables (where supplied) are used to make the electrical connections from the first and last PV panel in each string, back to the inverter. Where practicable, it is recommended that these cables are routed between the underlay and tiling battens and fed through a horizontal lap in the underlay, near to the apex of the roof into the roof space below (and ultimately to where inverter is located).
ii. Before the cables for the inverter are connected to the pre-wired connectors of the PV panel array it is essential that they are first properly secured by wrapping around a batten-rafter junction as shown above. This relieves any strain on the connectors and prevents the inverter cables detaching from the PV panel connectors.

iii. Once the inverter cable has been secured, it can be connected to the pre-wired connectors of the PV panel array. The +ve and −ve connections from each end of the string of PV panels are connected to the +ve and −ve inputs of the inverter as per the circuit diagram.

iv. Depending upon the inverter specified, additional strings of PV panels can be connected to the same inverter using the spare sets of +ve and −ve inputs available. Note the maximum number of PV panels that can be connected to the inverter is limited by the capacity of the inverter. Check that the inverter has sufficient capacity for the size of the PV panel array being connected. For large arrays, more than one inverter may be required.