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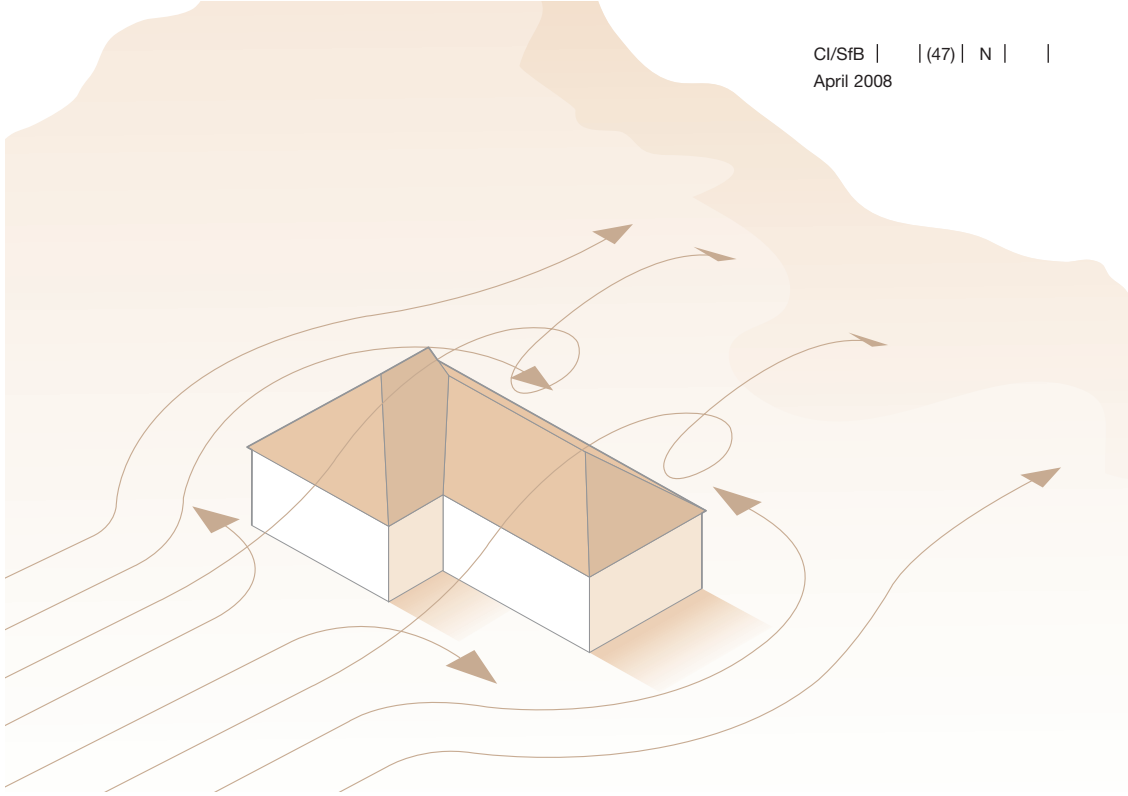

Roof Tile fixing specification:

The Zonal method user's guide

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Pages 2-7 of this Guide are a joint publication prepared by the technical committees of the Concrete Tile Manufacturers' Association, Clay Roof Tile Council, and the National Federation of Roofing Contractors.

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MARLEY Eternit

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Introduction

The Zonal Method is a method for obtaining a fixing specification for roof tiles and is a simplification of the calculations defined in BS 5534[1], 'Code of practice for slating and tiling (including shingles)'. The assumptions made in the simplification process may produce a specification with more or stronger fixings than that required if the full BS 5534[1] calculation is undertaken.

Marley Eternit have provided fixing tables* for their products in accordance with the Zonal Method. With some basic information about the design of roof tile to be used, the building and the site topography, these fixing tables will provide a fixing specification without the need for complex calculations.

* All manufacturers' fixing tables follow the same layout.

Scope

Included in the scope of this guide are roofs covered with single-lap and double-lap clay and concrete roof tiles including ridges, hips, verges and valley junctions (for exclusions see Appendix B).

Designers, specifiers and users are advised to check that the manufacturers' fixing tables refer to tiles, fittings and accessories that are manufactured to the appropriate British or European Standard or supported by recognised UKAS-accredited third-party assessment.

Where reference is made to the fixing specifications of proprietary products and to manufacturers' recommendations, the specifier should obtain evidence that these fixing specifications and recommendations have been proven by relevant experience or relevant test method data based on the conditions and methods of use in the UK climate to be fit for purpose.

In cases where the fixing specifications concerning the use of proprietary products varies from those contained in BS 5534[1], it is essential that the manufacturer's recommendations give the designer and user adequate assurance of performance. It is advisable that the designer, specifier, or user seeks assurances at the design stage of a project that such recommendations are appropriate for the intended application.

How to use the zonal method

Information required

To use the Zonal Method the following information is required:

1 The manufacturer's name and model of roof tile to be used.

2 The altitude of the site (less than 100m, 100 to 200m, over 200m but less than 300m).

3 The wind speed zone in which the building lies (1, 2, or, 3). This can be obtained from the map given in Appendix A.

4 The height of the building (less than or equal to 5m, 10m, or, 15m).

5 The pitch of the roof (e.g. for single lap tiles less than 35°; 35°-44°; or, 45°-54°; for double lap 35°-59°).

Note: The tile manufacturer should be consulted to determine the minimum pitch for the tile selected. Roofs with long rafters may be subject to additional pitch restrictions.

6 The headlap requirement for single lap tiles (75mm or 100mm).

7 If counter-battens are to be used.

How to use the Tile Fixing Tables

Check that the table to be used is the current version from the manufacturer of the roof tile that is to be fitted.

The following sequence should be used:

1 Within the appropriate manufacturer's table, identify the sub-table relevant to the site's altitude. e.g. less than 100m; 101 to 200m; or, 201 to 300m.

2 Within the altitude sub-table identify the wind speed zone appropriate for the site location (Zone 1, 2 or 3). This can be obtained from the map given in Appendix A.

3 Identify the building height to ridge (5m, 10m, 15m).

4 For single lap tiles identify the headlap column (75 or 100mm). Where the headlap falls between 75mm and 100 mm use the 75mm fixing specification for the designated lap.

5 For single lap tiles identify the roof pitch column (less than 35°; 35°-44°; or, 45°-54°).

6 For plain tiles identify the roof pitch column (e.g. 35°-59°).

7 The fixing specification can then be obtained, (e.g. A to F).

Manufacturers' fixing tables

For each tile type two sets of Tile Fixing Specification tables will be available from the manufacturer:

Tiles fixed to battens only; and
Tiles fixed to battens over counter-battens.

Both will require that all perimeter tiles are fixed, including tiles adjacent to valleys and, where appropriate, verge specifications will be provided. The tile fixing specification will be in accordance with the following format:

Zonal Fixing specification	Single lap tiles	Double lap tiles
A	No fixings required (except perimeters)	Not Applicable
B	Each tile once nailed (right hand nail hole – flat tiles)	Each tile twice nailed every fifth course
C	Each tile twice nailed (flat tiles only)	Each tile twice nailed every fourth course
D	Each tile clipped	Each tile twice nailed every third course
E	Each tile once nailed and clipped	Each tile twice nailed every second course
F	Each tile twice nailed and clipped	Each tile twice nailed

Notes:

- The manufacturers shall base their zonal fixing specifications on the Zonal Method Technical Reference[2] developed by the CTMA and the CTRC. The manufacturers shall ensure that the specifications are appropriate for their products.
- The manufacturer may also specify the use of improved nails (e.g. ring shank nails) for fixing tiles. Where these are required the Zonal Method fixing specification letter will be marked with an asterisk, e.g. **C***.
- The Zonal Method calculations are based on the use of substructures that provide a shielding factor of 1, e.g. flexible underlays and rigid underlays, including, board sarking, liner trays and sandwich panels.
- The manufacturers may define additional fixing specifications to those in the table and assign fixing specification letters from **G** onwards. In some cases the manufacturer may specify a 'proprietary system' and this will be marked **PS** and the manufacturer should be contacted for the details of the fixing method.

Hips, hip-ridges, ridges, verges, valley junctions, penetrations and openings

Hips (bonnets, arris and purpose-made fittings for plain tiles)

Hips should be installed in accordance with BS 5534[1], BS 8000-6[3] and the manufacturer's instructions. Individual bonnet, arris and purpose made hip tiles to be used in each course with double-lap plain tiles should be mechanically fixed with nails, and head bedded to prevent uplift.

Hip-ridges, ridges, verges and valley junctions

Ridges should be installed in accordance with BS 5534[1], BS 8000-6[3] and the manufacturer's instructions.

The mechanical fixing of all hip ridges and ridges is recommended. But in all cases, to comply with BS 5534[1] and BS 8000-6[3], hip-ridges or ridges should be mechanically fixed for a distance of not less than two consecutive units or a distance of 900mm, whichever is the greater, from the face of rigid masonry supports such as gables, dormers, valley junctions, abutments and separating walls where there is a risk that differential movement may take place.

All verge tiles or verge components, should be clipped (single lap tiles), or twice nailed (double lap plain tiles), or secured by using a proprietary dry verge system.

All methods used for the mechanical fixing of hip-ridges, ridges and verges should meet the requirements of BS 5534[1] and BS 8000-6[3], including proprietary 'dry fix' systems, which should be fixed strictly in accordance with the selected manufacturer's instructions.

Roof penetrations and openings (i.e.roof windows, chimneys)

Consideration should be given to the location of any penetrations and openings in the roof to facilitate the optimum tile module so as to avoid small cut tiles. All tiles adjacent to roof penetrations or openings should be mechanically fixed.

References

1 BS 5534, Code of practice for slating and tiling (including shingles), British Standards Institution, 2003

2 Zonal Method Technical Reference CRTC / CTMA 2006

3 BS 8000–6, Workmanship on building sites – Code of practice for slating and tiling of roofs and claddings, British Standards Institution, 1990

4 BS 6399–2, Loading for buildings – Code of practice for wind loads, British Standards Institution, 1997

Further guidance

Practical guidance on the application of single-lap and double-lap tiling can also be obtained from CITB/CS Trainer Resource Package for Operatives in the Construction Industry Manuals', Construction Industry Training Board, 2002:

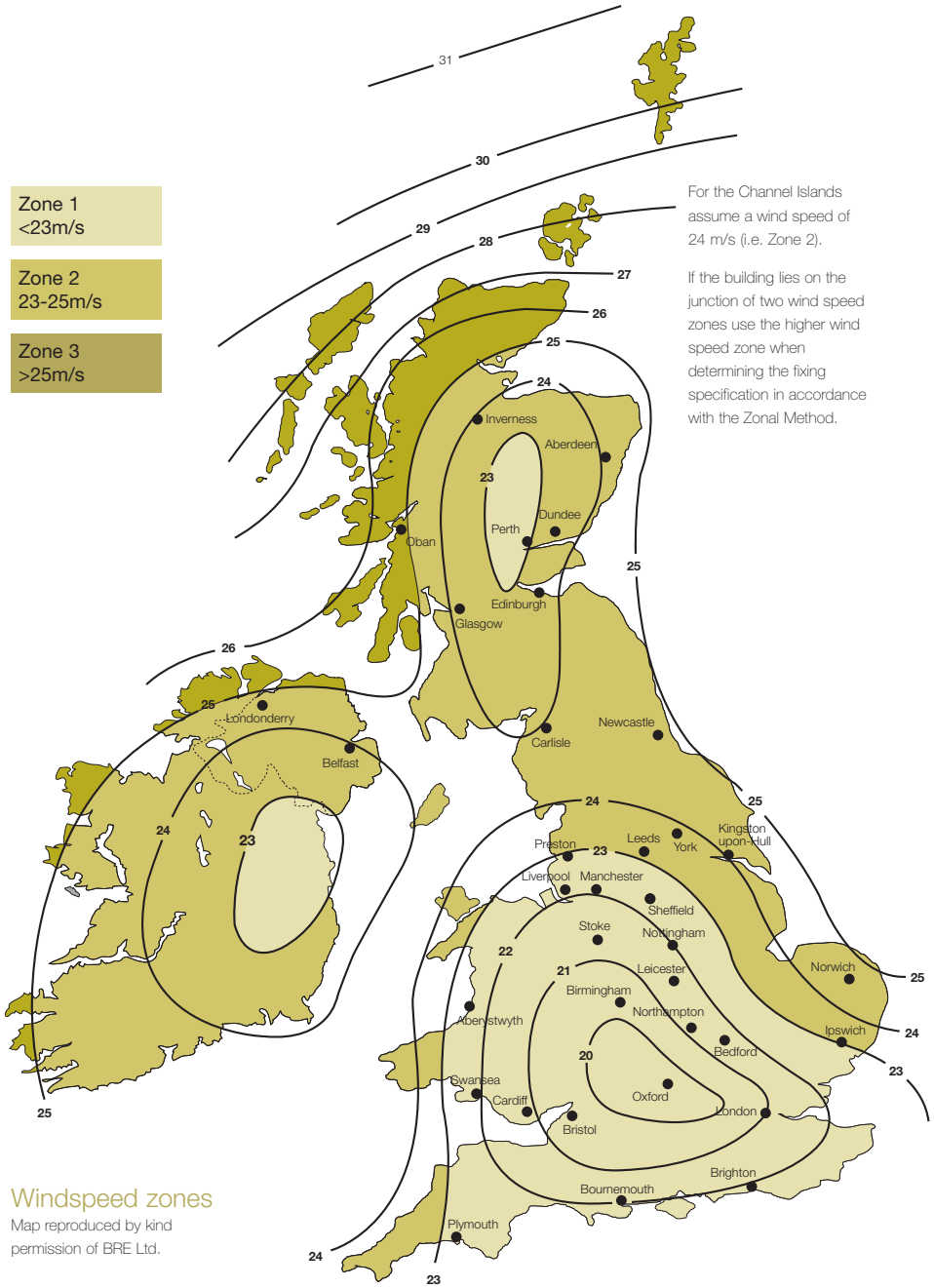
- CTP 036/1 – Roof Slating and Tiling – Common Materials and Methods;
- CTP 036/2 – Roof Slating and Tiling – Single–lap, Variable Gauge, Interlocking Tiles;
- CTP 036/3 – Roof Slating and Tiling – Double-lap, Variable Gauge, Plain Tiles;
- CTP 036/5 – Roof Slating and Tiling – Single-lap, Fixed Gauge, Interlocking and mitred tiles.

Appendix A: Map of UK

Zone 1
<23m/s

Zone 2
23-25m/s

Zone 3
>25m/s



For the Channel Islands assume a wind speed of 24 m/s (i.e. Zone 2).

If the building lies on the junction of two wind speed zones use the higher wind speed zone when determining the fixing specification in accordance with the Zonal Method.

Windspeed zones

Map reproduced by kind permission of BRE Ltd.

Appendix B: List of exclusions

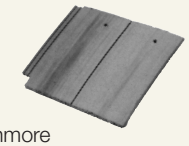
Further guidance

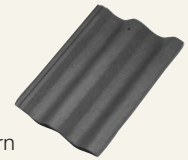
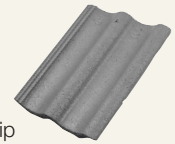
The Zonal Method is not applicable in the following circumstances:

- For buildings where the site altitude is greater than 300m.
- For buildings on sites where the maximum gradient of the land within 200 m of the building is greater than 10%.
- Where the building is within 6 kilometres of an airport and is plus or minus 10 degrees each side of the runway centre line measured from the touchdown point.
- Where the ridge height of the building is greater than 15 m.
- Where the roof pitch is greater than 54° for single lap tiles and 59° for double lap tiles.
- For buildings where the roof substructure does not provide a shielding factor of 1 as defined in BS 5534[1] e.g. the roof does not have an underlay or sub-roof system such as liner trays or sandwich panels.
- For tiles or slates not made of concrete or clay.
- Heritage, listed or historic buildings requiring restoration using traditional skills.
- For buildings on sites located in wind zones where the wind speed is greater than 25m/s i.e. Zone 3.

The fixing specification for the roof covering of any excluded site or building must be determined by calculation in accordance with the methods described in BS 5534[1] and BS 6399-2[4]. For example, in some extreme cases, special nails or clips may be required.

Appendix C:
Marley Eternit tile fixing tables

Tile or slate	Pages
 Plain tile (clay and concrete)	**10-11**
 Melbourn	**12-13**
 Edgemere/Duo Edgemere	**14-15**
 Ashmore	**16-17**

Tile or slate	Pages
 Modern/Duo Modern	**18-19**
 Malvern	**20-21**
 Mendip	**22-23**
 Double Roman	**24-25**

Tile or slate	Pages
 Ludlow Major	**26-27**
 Ludlow Plus	**28-29**
 Anglia	**30-31**
 Wessex	**32-33**

Tile or slate	Pages
 Symphony	**34-35**
 Domino	**36-37**

Plain tile (clay & concrete) fixing specification

Key

A	Not applicable
B	Each tile twice nailed every fifth course
C	Each tile twice nailed every forth course
D	Each tile twice nailed every third course
E	Each tile twice nailed every second course
F	Each tile twice nailed
☎	Refer to Technical Advisory Service for specifications
*	Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		65mm	35mm
Pitch		35°-59°	90°
Zone 1	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 2	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.		

Site altitude 101-200m

Headlap		65mm	35mm
Pitch		35°-59°	90°
Zone 1	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 2	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.		

Site altitude 201-300m

Headlap		65mm	35mm
Pitch		35°-59°	90°
Zone 1	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 2	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.		

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Roofs *with* counter battens

Site altitude 0-100m

Headlap		65mm	35mm
Pitch		35°-59°	90°
Zone 1	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 2	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.		

Site altitude 101-200m

Headlap		65mm	35mm
Pitch		35°-59°	90°
Zone 1	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 2	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.		

Site altitude 201-300m

Headlap		65mm	35mm
Pitch		35°-59°	90°
Zone 1	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 2	5m	Consult Marley Eternit Technical Advisory Service	F
	10m	Consult Marley Eternit Technical Advisory Service	F
	15m	Consult Marley Eternit Technical Advisory Service	F
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.		

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Melbourn fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		50mm			65mm		
Pitch		20°-34°	35°-44°	45°-54°	15°-34°	35°-44°	45°-54°
Zone 1	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 2	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		50mm			65mm		
Pitch		20°-34°	35°-44°	45°-54°	15°-34°	35°-44°	45°-54°
Zone 1	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 2	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		50mm			65mm		
Pitch		20°-34°	35°-44°	45°-54°	15°-34°	35°-44°	45°-54°
Zone 1	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 2	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	☎	C *	C *	☎	C *	C *
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Roofs *with* counter battens

Site altitude 0-100m

Headlap		50mm			65mm		
Pitch		20°-34°	35°-44°	45°-54°	15°-34°	35°-44°	45°-54°
Zone 1	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 2	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		50mm			65mm		
Pitch		20°-34°	35°-44°	45°-54°	15°-34°	35°-44°	45°-54°
Zone 1	5m	C *	C *	C *	C *	C *	C *
	10m	C *	C *	C *	C *	C *	C *
	15m	C *	C *	C *	C *	C *	C *
Zone 2	5m	C *	C *	C *	C *	C *	C *
	10m	☎	C *	C *	☎	C *	C *
	15m	☎	C *	C *	☎	C *	C *
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		50mm			65mm		
Pitch		20°-34°	35°-44°	45°-54°	15°-34°	35°-44°	45°-54°
Zone 1	5m	C *	C *	C *	C *	C *	C *
	10m	☎	C *	C *	☎	C *	C *
	15m	☎	C *	C *	☎	C *	C *
Zone 2	5m	☎	C *	C *	☎	C *	C *
	10m	☎	C *	C *	☎	C *	C *
	15m	☎	C *	C *	☎	C *	C *
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Edgemere/Duo Edgemere fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	D	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	E	E	E	E	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	E	E	E	E	E
	15m	E	E	E	F	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

† Below 25°, use non-nail hole tiles only

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	E	E
	15m	E	D	E	E	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	E	E
Zone 2	5m	E	D	E	E	E	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	E	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 2	5m	E	E	E	E	E	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

† Below 25°, use non-nail hole tiles only

Ashmore fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		77mm			92mm		
Pitch		22.5°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	C	C	E	C	C
	10m	E	C	C	E	C	E
	15m	E	C	E	E	E	E
Zone 2	5m	E	C	C	E	C	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		77mm			92mm		
Pitch		22.5°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	C	C	E	C	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 2	5m	E	E	E	E	E	E
	10m	E	E	E	F	E	E
	15m	F	E	E	F*	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		77mm			92mm		
Pitch		22.5°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	E	E	E	E	E
	10m	E	E	E	F	E	E
	15m	F	E	E	F*	E	E
Zone 2	5m	E	E	E	F	E	E
	10m	F*	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Roofs *with* counter battens

Site altitude 0-100m

Headlap		77mm			92mm		
Pitch		22.5°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	C	E	E	E	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 2	5m	E	E	E	E	E	E
	10m	F	E	E	F*	E	E
	15m	F*	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		77mm			92mm		
Pitch		22.5°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	E	E	E	E	E
	10m	F	E	E	F	E	E
	15m	F*	E	E	F*	E	E
Zone 2	5m	F	E	E	F*	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		77mm			92mm		
Pitch		22.5°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	F	E	E	F*	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	☎	E	E	☎	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	F	☎	F	F
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Modern/Duo Modern fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	E	D	E	D	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	E	E	E	D	E
	15m	E	E	E	E	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m a full calculation to BS 6399-2 and BS 5534 is required

† Minimum pitch for granular Modern is 25° (100mm lap) or 30° (75mm lap). Below 25°, use non nailhole tiles only.

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	E	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	E	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

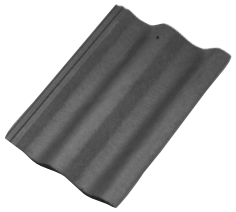
Headlap		75mm			100mm		
Pitch		†22.5°-34°	35°-44°	45°-54°	†17.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	E	E	E	E	E
	15m	E	E	E	E	E	E
Zone 2	5m	E	E	E	E	E	E
	10m	E	E	E	E	E	E
	15m	F	E	E	F	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

† Minimum pitch for granular Modern is 25° (100mm lap) or 30° (75mm lap). Below 25°, use non nailhole tiles only.

Malvern fixing specification



Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		17.5°-34°	35°-44°	45°-54°	12.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		17.5°-34°	35°-44°	45°-54°	12.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	E	E	E*	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		17.5°-34°	35°-44°	45°-54°	12.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	E	E	E*	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	E*	E	E	E*	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		17.5°-34°	35°-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	E*	E	E	E*	E	E
Zone 2	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		17.5°-34°	35°-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	☎	E	E	☎	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		17.5°-34°	35°-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	☎	E	E	☎	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	☎	E	E	☎	E	E
	10m	☎	E*	E*	☎	E*	E*
	15m	☎	E*	E*	☎	E*	E*
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Mendip fixing specification

Key

A No fixings required

B Each tile once nailed (right hand nail hole on flat tiles)

C Each tile twice nailed (flat tiles only)

D Each tile clipped

E Each tile once nailed and clipped

F Each tile twice nailed and clipped

☎ Refer to Marley Eternit Technical Advisory Service for specification

* Requires the use of improved nails

Roofs ***without*** counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡22.5°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡22.5°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	E*	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡22.5°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	E*	D	E	E*	E	E
Zone 2	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Mendip is 25° (100mm lap) or 30° (75mm lap).

Roofs ***with*** counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡22.5°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	E	E	E*	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡22.5°-34°	35°-44°	45°-54°	35°-44°	45°-54°	
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	E*	E	E	E*	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡22.5°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	E*	D	E	E*	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	☎	E	E	☎	E	E
	10m	☎	E	E	☎	E	E*
	15m	☎	E*	E*	☎	E*	E*
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Mendip is 25° (100mm lap) or 30° (75mm lap).

Double Roman fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	E*	D	E	E*	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 2	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Double Roman is 30° (75mm lap).

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	D	E	E	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5°-34°	35°-44°	45°-54°
Zone 1	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	☎	E	E	☎	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E*	☎	E	E*
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Double Roman is 30° (75mm lap).

Ludlow Major fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Ludlow Major is 30° (75mm lap).

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	☎	D	E	E*	D	E
Zone 2	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	☎	E	E	☎	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Ludlow Major is 30° (75mm lap).

Ludlow Plus fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Ludlow Plus is 30° (75mm lap).

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡25°-34°	35°-44°	45°-54°	22.5-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Ludlow Plus is 30° (75mm lap).

Anglia fixing specification

Key

A No fixings required

B Each tile once nailed (right hand nail hole on flat tiles)

C Each tile twice nailed (flat tiles only)

D Each tile clipped

E Each tile once nailed and clipped

F Each tile twice nailed and clipped

☎ Refer to Marley Eternit Technical Advisory Service for specification

* Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡30°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡30°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡30°-34°	35°-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Anglia Plus is 30° (75mm lap).

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		‡30°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		‡30°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

altitude 201-300m

Headlap		75mm			100mm		
Pitch		‡30°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	☎	D	E	☎	D	E
Zone 2	5m	E*	D	E	E*	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

‡ Minimum pitch for granular Anglia Plus is 30° (75mm lap).

Wessex fixing specification

Key

- A No fixings required
- B Each tile once nailed (right hand nail hole on flat tiles)
- C Each tile twice nailed (flat tiles only)
- D Each tile clipped
- E Each tile once nailed and clipped
- F Each tile twice nailed and clipped
- ☎ Refer to Marley Eternit Technical Advisory Service for specification
- * Requires the use of improved nails

Roofs *without* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		†15°-34°	35°-44°	45°-54°	†15°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		†15°-34°	35°-44°	45°-54°	†15°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E	D	E	E	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		†15°-34°	35°-44°	45°-54°	†15°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	E*	D	E
	15m	E*	D	E	☎	D	E
Zone 2	5m	E*	D	E	E*	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

† Minimum pitch for nail holed Wessex tiles is 25°. Below 25°, use non-nail hole tiles only

Roofs *with* counter battens

Site altitude 0-100m

Headlap		75mm			100mm		
Pitch		†15°-34°	35°-44°	45°-54°	†15°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E	D	E	E	D	E
	15m	E*	D	E	E*	D	E
Zone 2	5m	E	D	E	E	D	E
	10m	E*	D	E	☎	D	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		75mm			100mm		
Pitch		†15°-34°	35°-44°	45°-54°	†15°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	E	D	E
	10m	E*	D	E	☎	D	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	E*	D	E	☎	E	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		75mm			100mm		
Pitch		†15°-34°	35°-44°	45°-54°	†15°-34°	35°-44°	45°-54°
Zone 1	5m	E	D	E	☎	D	E
	10m	☎	E	E	☎	E	E
	15m	☎	E	E	☎	E	E
Zone 2	5m	☎	E	E	☎	E	E
	10m	☎	E	E	☎	E	E*
	15m	☎	E*	E*	☎	E*	E*
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

† Minimum pitch for nail holed Wessex tiles is 25°. Below 25°, use non-nail hole tiles only

Symphony fixing specification

Key

D Each tile clipped

E Each tile twice clipped (head and side clip)

☎ Refer to Marley Eternit Technical Advisory Service for specification

Roofs *without* counter battens

Site altitude 0-100m

Headlap		96mm			124mm		
Pitch		12.5°-34°	35-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	E	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	E	D	E	E	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		96mm			124mm		
Pitch		12.5°-34°	35-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	☎	D	E	☎	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		96mm			124mm		
Pitch		12.5°-34°	35-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	E
Zone 2	5m	☎	D	E	☎	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Roofs *with* counter battens

Site altitude 0-100m

Headlap		96mm			124mm		
Pitch		12.5°-34°	35-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	E
Zone 2	5m	☎	D	E	☎	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		96mm			124mm		
Pitch		12.5°-34°	35-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	☎	D	E	☎	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	E
Zone 2	5m	☎	D	E	☎	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		96mm			124mm		
Pitch		12.5°-34°	35-44°	45°-54°	12.5°-34°	35°-44°	45°-54°
Zone 1	5m	☎	D	E	☎	D	E
	10m	☎	D	E	☎	D	E
	15m	☎	D	E	☎	D	☎
Zone 2	5m	☎	D	E	☎	D	E
	10m	☎	☎	E	☎	☎	☎
	15m	☎	☎	E	☎	☎	☎
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Domino fixing specification

Key

D Each tile clipped

E Each tile twice clipped (head and side clip)

☎ Refer to Marley Eternit Technical Advisory Service for specification

Roofs *without* counter battens

Site altitude 0-100m

Headlap		83mm			94mm		
Pitch		25°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		83mm			94mm		
Pitch		25°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		83mm			94mm		
Pitch		25°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Roofs *with* counter battens

Site altitude 0-100m

Headlap		83mm			94mm		
Pitch		25°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 101-200m

Headlap		83mm			94mm		
Pitch		25°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude 201-300m

Headlap		83mm			94mm		
Pitch		25°-34°	35-44°	45°-54°	25°-34°	35°-44°	45°-54°
Zone 1	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 2	5m	D	D	E	D	D	E
	10m	D	D	E	D	D	E
	15m	D	D	E	D	D	E
Zone 3	For Zone 3, a full calculation to BS 6399-2 and BS 5534 is required.						

Site altitude greater than 300m

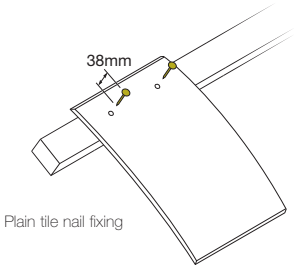
For altitudes above 300m, a full calculation to BS 6399-2 and BS 5534 is required

Fixings

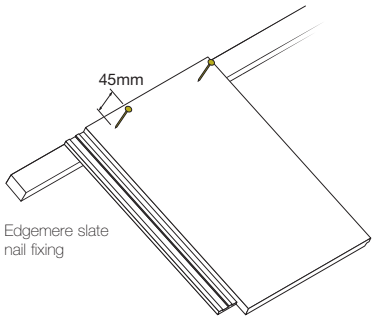
Marley Eternit fixing components

Marley Eternit offers a wide range of tiles, clips and dry fix components for the simple, fast installation of all their product ranges, at the same time meeting the requirements of the zonal fixing method.

Some typical examples of clips and nails are shown on these pages. Full tabulated details of clip and nail pack availability are given on pages 38-39.



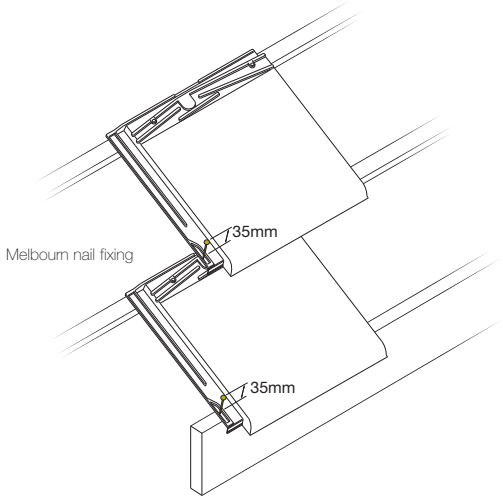
Plain tile nail fixing



Edgemere slate nail fixing

Tile nails

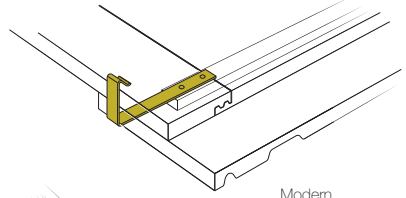
Nails for use with tiles should be of aluminium, stainless steel, phosphor or silicon bronze. Aluminium nails intended for use with tiles should conform to BS 1202-3 and should be clout head nails of 3.35mm or 2.65mm diameter. The length of nail will be determined by the required wind uplift and the design of the tile (see tables on page 42).



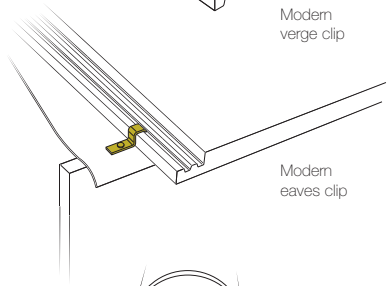
Melbourn nail fixing

Tile clips

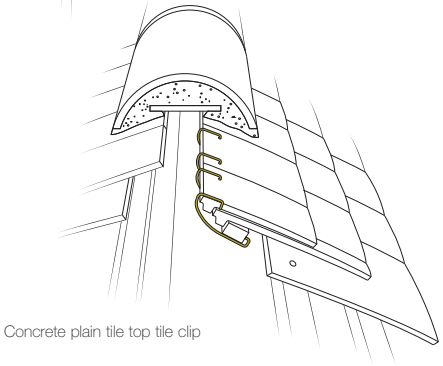
During the past 30 years, the most effective method for securing interlocking tiles has been with aluminium clips, which provide good tensile strength and non-corrosive qualities. Stainless steel nails and clips are available for areas of high exposure or where high durability is required. All Marley Eternit proprietary tile clip designs meet the requirements of BS 5534 in terms of material specification and strength.



Modern verge clip



Modern eaves clip

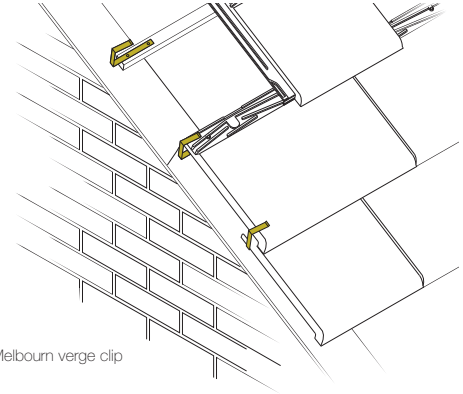


Concrete plain tile top tile clip

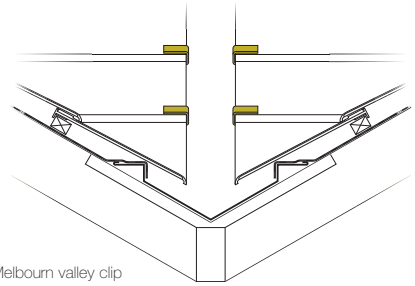
Marley Eternit dry fix systems

To improve the speed and economy of roof construction, a choice of high performance, maintenance-free, dry fix systems are offered to suit ridge, verge, hip and valley details providing easy-to-fix alternatives to traditional mortar bedding.

When correctly installed, they are designed to satisfy the requirements of BS 5534 'Code of practice for slating and tiling' with respect to the mechanical fixing of roof fittings to resist wind uplift and the provision of a weathertight roof.



Melbourn verge clip



Melbourn valley clip

Clip and nail packs

Clip and nail packs

The table below shows the quantities packaged together with the correct sized nails.

	Tile clip and nail pack 100 clips and nails		Tile clip and nail pack 500 clips and nails		Right hand verge clip and nail pack 50 clips and nails		Left hand verge clip and nail pack 50 clips and nails		Eave clip and nail pack 100 clips and nails		500g nail pack		
	Code No.	Pack No.	Code No.	Pack No.	Code No.	Pack No.	Code No.	Pack No.	Code No.	Pack No.	Code No.	Pack No.	Approx. Count
Aluminium Alloy													
Ludlow Plus	30265	1	30266	6	30290	33	30290	33	30277	22	30350	27	396
Anglia	30269	3	30270	8	30284	12	30286	14	30274	19	30349	26	520
Ludlow Major	30265	1	30266	6	30287	15	30287	15	30277	22	30371	32	373
Mendip	30267	2	30268	7	30288	16	30287	15	30276	21	30352	29	287
Malvern	30267	2	30268	7	30288	16	30287	15	30276	21	30353	30	225
Double Roman	30271	4	30272	9	30289	17	30290	33	30275	20	30351	28	308
Wessex	30267	2	30268	7	30286	14	30286	14	30278	23	30349	26	520
Modern	30265	1	30266	6	30290	33	30290	33	30273	18	30350	27	396
Duo Modern	30265	1	30266	6	30290	33	30290	33	30273	18	30350	27	396
Edgemere	30295	5	30296	10	30263	11	30263	11	30297	24	30398	31	432
Duo Edgemere	30295	5	30296	10	30263	11	30263	11	30297	24	30398	31	432
Ashmore*	n/a	n/a	n/a	n/a	30263	11	30263	11	30297	24	30398	31	432
Plain	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	30348	25	793
Stainless steel													
Ludlow Plus	n/a	n/a	30106	40	n/a	n/a	n/a	n/a	30110	50	30120	60	137
Anglia	n/a	n/a	30102	41	n/a	n/a	n/a	n/a	30111	51	30121	61	182
Ludlow Major	n/a	n/a	30106	40	n/a	n/a	n/a	n/a	30110	50	30127	67	137
Mendip	n/a	n/a	30103	42	n/a	n/a	n/a	n/a	30112	52	30123	63	99
Malvern	n/a	n/a	30103	42	n/a	n/a	n/a	n/a	30112	52	30122	62	92
Double Roman	n/a	n/a	30104	43	n/a	n/a	n/a	n/a	30116	56	30124	64	109
Wessex†	n/a	n/a	30103	42	n/a	n/a	n/a	n/a	n/a	n/a	30121	61	182
Modern	n/a	n/a	30106	40	n/a	n/a	n/a	n/a	30114	54	30120	60	137
Duo Modern	n/a	n/a	30106	40	n/a	n/a	n/a	n/a	30114	54	30120	60	137
Edgemere	n/a	n/a	30105	44	n/a	n/a	n/a	n/a	30115	55	30125	65	109
Duo Edgemere	n/a	n/a	30105	44	n/a	n/a	n/a	n/a	30115	55	30125	65	109
Ashmore	30130	34	30131	35	n/a	n/a	n/a	n/a	n/a	n/a	30125	65	109
Plain	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	30126	66	302

* Clips only

† Wessex eaves clip and nail pack only available in aluminium alloy.

Interlocking slate clips and nails

All slate clips and nails are provided in stainless steel.

Profile	Slate clip pack 100 clips and nails Code No.	Slate nail pack 100 nails Code No.	Slate eave clip pack 50 clips and nails Code No.	Slate verge and valley clip pack 25 clips and 50 nails Code No.
Melbourn	n/a	n/a	S50023*	30260

* Eaves fixing kit (box of 50)

Symphony clay interlocking tile

	Description	Code	Unit
Tile clip	One piece side interlock clip	MA30450	100
Head clip	One piece head clip	MA30451	100
Verge fixings	Verge clip and nail pack	MA30285	50
Eaves fixings	Eave clip pack	MA30452	100
	Eave clip and nail pack	MA30455	100

Domino clay interlocking tile

	Description	Code	Unit
Tile clip	One piece side interlock clip	MA30453	100
Head clip	One piece head clip	MA30454	100
Verge fixings	Verge clip and nail pack	MA30286	50
Eaves fixings	Eave clip pack	MA30452	100
	Eave clip and nail pack	MA30455	100

Miscellaneous

Description	Code
Concrete Plain tile top clip (50 stainless steel clips)	30322
Hip Irons – 4mm (roof pitch under 35°)	30311
Hip Irons – 6mm (roof pitch 35° and over)	30312
One-piece clip and nail (500 no.)	30430