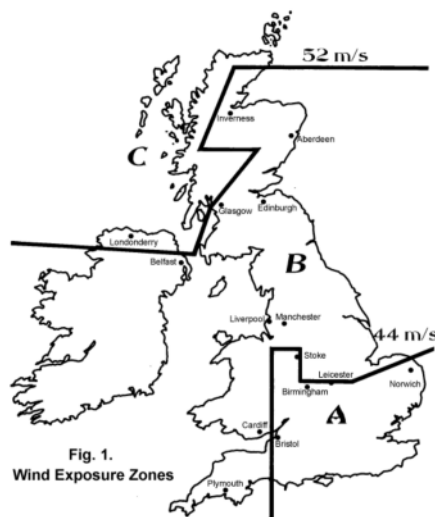


Warm Roof Fixings

Introduction

The pitched warm roof method of insulation has established itself very rapidly. With insulation fixed over the rafters, using counterbattens to hold it in place, the whole of the loft area is kept warm and dry. The need for water tanks and pipes to be additionally insulated is no longer necessary. By using the Target Fixings Skew Fast insulation fixings to fix the counterbattens over the insulation, the counterbattens effectively become the rafters. Tile or slate battens can be fixed back to the counterbattens in the standard, and accepted, manner - subject to the relevant timber codes. With a very small effective core diameter, the Grade 304 stainless steel Skew Fast can be used in timber widths of 30 mm or below. The diameter does not increase with length, still allowing conformation with CP112:1972, something not possible with a conventional nail of equivalent length.



Performance Requirements

There are two basic elements that need to be considered when designing the fixing detail of warm roofs. The wind suction loading is determined by the location of the structure within the UK, the slope of the surrounding land

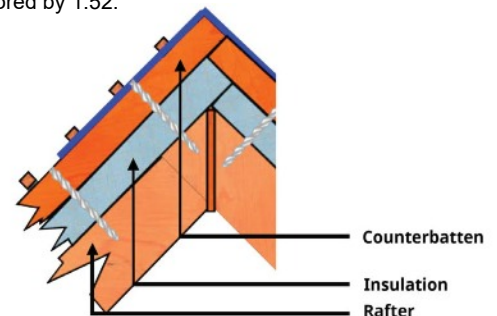
and the structure's overall height. Because of the crushable nature of the insulation material, there is an inherent sliding load. The factors that determine the sliding loads are the thickness of the insulation, the slope of the roof and the weight of the roof covering materials. The fixing design will need to address all these factors.

Fixing Density to Resist Wind Loads

C.P. 3 Chapter V, Part 2, 1972 and amended in 1986, describes a wind exposure chart which is reproduced in Figure 1.

Wind zones A, B and C are defined as follows:
Wind zone A - Basic wind speed up to 44 m/s
Wind zone B - Basic wind speed of 44 to 52 m/s

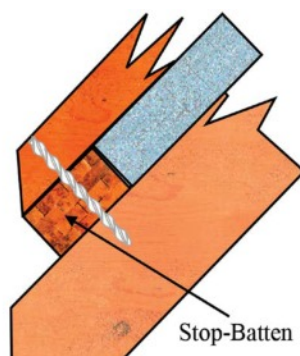
Where the structure is in excess of 15 m high, the fixing density must be factored by 1.52.



Fixing Details

The length of the fixing is calculated by the total thickness of material build-up above the rafter plus an additional 35 mm for softwood rafters, or 25 mm for hardwood rafters. Additional length must be allowed for if the rafters have a bow - as is common in barn conversions. The Skew Fast is driven like an ordinary nail, but screws through the counterbatten and into the rafter as it is driven. The thickness of the counterbatten will need to be carefully considered. If the thickness of 37+ mm is selected, the tile batten may be fixed using an ordinary clout nail. For 25 mm to 36 mm thickness, an improved nail (e.g. 'ring shank') must be used. For counterbattens less than 24mm thick, consideration should be given to fixing through the tile batten and counterbatten in one single fixing operation using a longer

Skew Fast. The tendency for any sliding load may be decreased by the introduction of a stop-batten, usually at eaves level. The stop-batten would need to be the same thickness as the insulation material and is inserted in place of the insulation and is then structurally fixed to the rafters. The counterbattens are then fixed directly on top of the stop-batten. If the roof is long, over 8 m from eaves to ridge, an additional stop-batten should be introduced at the mid point. A stop-batten allows the use of much thicker insulation materials without the need for a greatly increased fixing density.



Below are the tables we use to calculate the density of Skew Fast that are required to resist sliding loads imposed on the roof. These are calculated using British Standard tables, and take into account the weight of tiles, the pitch of roof, the insulation thickness and whether there is a stop batten installed at the eaves level. The number that is found in the table corresponds to the number of Skew Fast required per square metre to resist sliding loads. Please note that wind loads MUST also be taken into account. The first three tables below show the impact of using different insulation depths WITH a stop batten installed at eaves level.

Insulation Thickness 36-50mm (WITH STOP BATTEN)

Laid Tile Weight

kg/m ²	Roof Pitch							
	20°	30°	40°	50°	60°	70°	80°	90°
10	3.0	4.0	4.0	3.0	2.0	1.0	1.0	1.0
20	3.5	4.5	4.5	4.0	3.0	2.0	2.0	2.0
30	3.5	5.0	5.0	5.0	4.0	3.0	3.0	3.5
40	4.0	5.5	6.0	5.5	5.0	4.0	4.0	4.5
50	4.5	6.0	6.5	6.5	5.5	5.0	5.0	5.0
60	4.5	6.5	7.0	7.0	6.5	6.0	6.0	6.5
70	5.0	7.0	8.0	8.0	7.5	7.0	7.5	7.5
80	5.5	8.0	8.5	9.0	8.5	8.0	8.5	8.5
90	6.0	8.5	9.5	9.5	9.5	9.0	9.5	9.5
100	7.5	9.0	10.0	10.5	10.5	10.0	10.5	10.5

Insulation Thickness 51-75mm (WITH STOP BATTEN)

Laid Tile Weight

kg/m ²	Roof Pitch							
	20°	30°	40°	50°	60°	70°	80°	90°
10	3.0	4.0	4.0	3.0	2.0	1.0	1.0	1.0
20	3.5	4.5	4.5	4.0	3.0	2.0	2.0	2.0
30	3.5	5.0	5.0	5.0	4.0	3.0	3.0	3.5
40	4.0	5.5	6.0	5.5	5.0	4.0	4.0	4.5
50	4.5	6.0	6.5	6.5	5.5	5.0	5.0	5.0
60	4.5	6.5	7.0	7.0	6.5	6.0	6.0	6.5
70	5.0	7.0	8.0	8.0	7.5	7.0	7.5	7.5
80	5.5	8.0	8.5	9.0	8.5	8.0	8.5	8.5
90	6.0	8.5	9.5	9.5	9.5	9.0	9.5	9.5
100	7.5	9.0	10.0	10.5	10.5	10.0	10.5	10.5

Insulation Thickness 76-150mm (WITH STOP BATTEN)

Laid Tile Weight

kg/m ²	Roof Pitch		40°	50°	60°	70°	80°	90°
	20°	30°						
10	5.5	7.5	7.0	5.5	4.0	2.0	2.0	2.0
20	6.0	8.5	8.0	7.0	5.5	3.5	3.0	3.0
30	6.5	9.0	9.5	8.5	7.0	5.5	5.0	4.0
40	7.5	10.0	10.5	10.0	9.0	7.0	7.0	6.0
50	8.0	11.0	12.0	11.5	10.5	9.0	8.5	8.0
60	8.5	12.0	13.0	13.0	12.0	10.5	10.5	9.5
70	9.0	13.0	14.0	15.0	13.5	11.0	11.0	10.0
80	9.5	14.0	15.0	17.0	15.0	14.0	13.0	11.0
90	10.0	15.0	16.0	18.0	17.0	16.0	14.0	12.0
100	10.5	16.0	17.0	19.0	19.0	17.0	16.0	15.0

The second set of three tables shows the impact of using different insulation depths WITHOUT a stop batten installed at eaves Level.

Insulation Thickness 36-50mm (WITHOUT STOP BATTEN)

Laid Tile Weight

kg/m ²	Roof Pitch		40°	50°	60°	70°	80°	90°
	20°	30°						
10	3.0	4.0	4.0	3.0	2.0	1.0	1.0	1.0
20	3.5	4.5	4.5	4.0	3.0	2.0	2.0	2.0
30	3.5	5.0	5.0	5.0	4.0	3.0	3.0	3.5
40	4.0	5.5	6.0	5.5	5.0	4.0	4.0	4.5
50	4.5	6.0	6.5	6.5	5.5	5.0	5.0	5.0
60	4.5	6.5	7.0	7.0	6.5	6.0	6.0	6.5
70	5.0	7.0	8.0	8.0	7.5	7.0	7.5	7.5
80	5.5	8.0	8.5	9.0	8.5	8.0	8.5	8.5
90	6.0	8.5	9.5	9.5	9.5	9.0	9.5	9.5
100	7.5	9.0	10.0	10.5	10.5	10.0	10.5	10.5

Insulation Thickness 51-75mm (WITHOUT STOP BATTEN)

Laid Tile Weight

kg/m ²	Roof Pitch		40°	50°	60°	70°	80°	90°
	20°	30°						
10	5.5	7.5	7.0	5.5	4.0	2.0	2.0	2.0
20	6.0	8.5	8.0	7.0	5.5	3.5	4.0	4.0
30	6.5	9.0	9.5	8.5	7.0	5.5	5.5	6.0
40	7.5	10.0	10.5	10.0	9.0	7.0	7.5	7.5
50	8.0	11.0	12.0	11.5	10.5	9.0	9.5	9.5
60	8.5	12.0	13.0	13.0	12.0	11.0	11.5	11.5
70	9.0	13.0	14.0	15.0	13.5	13.0	13.5	13.5
80	9.5	14.0	15.0	17.0	15.0	15.0	15.5	15.5
90	10.0	15.0	16.0	18.0	17.0	17.0	18.0	18.0
100	10.5	16.0	17.0	19.0	19.0	19.0	20.0	20.0

Insulation Thickness 76-150mm (WITHOUT STOP BATTEN)

Laid Tile Weight

kg/m ²	Roof Pitch		40°	50°	60°	70°	80°	90°
	20°	30°						
10	11.0	15.0	14.0	11.0	8.0	4.0	4.0	4.0
20	12.0	17.0	16.0	14.0	11.0	7.0	8.0	8.0
30	13.0	18.0	19.0	17.0	14.0	11.0	11.0	12.0
40	15.0	20.0	21.0	20.0	18.0	14.0	15.0	15.0
50	16.0	22.0	24.0	22.0	21.0	18.0	19.0	19.0
60	17.0	24.0	26.0	26.0	24.0	22.0	23.0	23.0
70	18.0	26.0	28.0	30.0	27.0	26.0	27.0	27.0
80	19.0	28.0	30.0	34.0	30.0	30.0	31.0	31.5
90	20.0	30.0	32.0	36.0	34.0	34.0	36.0	36.0
100	21.0	32.0	34.0	38.0	38.0	38.0	40.0	40.0

The following tile weights can be used as a guide for quotations, but actual weights should be calculated prior to installation.

Tile Weights (Laid Weight – Kg/m²)

Marley

Plain Clay	80
Feature	70
Westwold	100
Ludlow Plus	50
Anglia Plus	50
Double Roman	50
Ludlow Major	50
Mendip	50
Modern	50
Wessex	60
Bold Roll	50
Supalite	30
Monarch	20
Plain Tile	80
Rosemary Plain Clay	80
Rosemary Cheslyn Clay	90

Redland

Cambrian Stone	20
Saxon Slate	50
Richmond Slate	60
Stonewall Slate	50
Delta Slate	60
Norfolk Pantile	50
Regent Tile	50
Grovebury Double Pantile	50
Bridgewater	50
50 Double Roman	50
Renown Tile	50
49 Tile	50
Downland Plain	50

Eternit Anchor

Rivendale	20
Eternit 2000	20
Duracem	20
Country	20
Shire	20
Gower	20

Roof Tiles

Bold Roll 87	40
Centurian	30
Senator	40
Vanguard 83	30
Viscount	40
Stone Slate	50
Anchorlite Slate	30
Plain Tiles	80

Other

Natural Welsh Slate	40
Metal Cladding System	10

DECRA

Roofing System	10
Stratos	10

General Tile Weights

TILE WEIGHT

A.C. or Steel Sheet	10
A.C. Slates	20
Natural Slates	30-40
Interlocking Concrete Tiles	40-60
Plain Clay Tiles	60-80
Concrete Slates	90-100
Cotswold Stone	100

Weight Kg/m²

10
20
30-40
40-60
60-80
90-100
100