

Target Fixings Ltd

Skew Fast

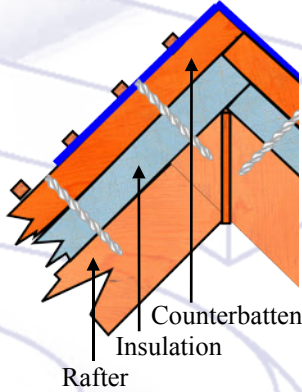
Warm Roof Fixings

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.

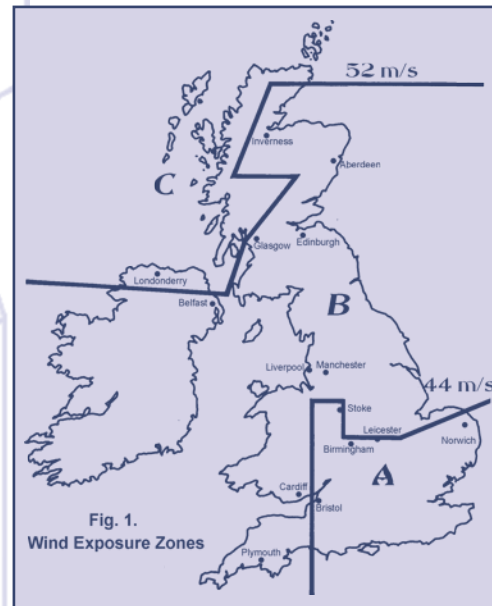


Fig. 1.
Wind Exposure Zones

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 24 mm 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.

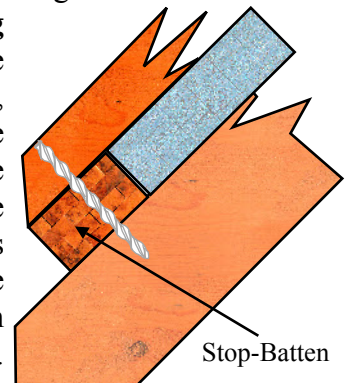


Table 1 - Number of Skew Fast per m² required to resist Wind suction

Wind Zone	Slope of Land within 1 km	Suction kN/m ²	Batten Thickness mm		
			25	37	50
A	Up to 1:20	2.5	4.0	3.0	2.0
	1:20 to 1:12.5	3.5	6.0	3.5	2.5
	No Limit	4.7	7.5	5.0	3.5
B	Up to 1:20	3.5	6.0	4.0	3.0
	1:20 to 1:12.5	4.3	7.0	4.5	3.5
	No Limit	6.6	11.0	7.0	5.5
C	Up to 1:20	4.1	6.0	4.5	3.0
	1:20 to 1:12.5	5.0	8.0	5.5	4.0
	No Limit	7.6	12.5	8.5	6.0

The wind suction Table 1 takes account of the effects of the slope of the land within 1 km. In the figures given, no account is taken of the positive effect of the weight of the roof covering.

Table 2i - Number of Skew Fast per m² required to resist Sliding Loads

FOR ROOFS WITHOUT STOP-BATTENS

Laid Tile Weights kg/m ²	Insulation Thickness 36 - 50 mm								Insulation Thickness 51 - 75 mm								Insulation Thickness 76 - 150 mm							
	Roof Pitch								Roof Pitch								Roof Pitch							
	20°	30°	40°	50°	60°	70°	80°	90°	20°	30°	40°	50°	60°	70°	80°	90°	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	5.5	7.5	7.0	5.5	4.0	2.0	2.0	2.0	11.0	15.0	14.0	11.0	8.0	4.0	4.0	4.0
20	3.5	4.5	4.5	4.0	3.0	2.0	2.0	2.0	6.0	8.5	8.0	7.0	5.5	3.5	4.0	4.0	12.0	17.0	16.0	14.0	11.0	7.0	8.0	8.0
30	3.5	5.0	5.0	5.0	4.0	3.0	3.0	3.5	6.5	9.0	9.5	8.5	7.0	5.5	5.5	6.0	13.0	18.0	19.0	17.0	14.0	11.0	11.0	12.0
40	4.0	5.5	6.0	5.5	5.0	4.0	4.0	4.5	7.5	10.0	10.5	10.0	9.0	7.0	7.5	7.5	15.0	20.0	21.0	20.0	18.0	14.0	15.0	15.0
50	4.5	6.0	6.5	6.5	5.5	5.0	5.0	5.0	8.0	11.0	12.0	11.5	10.5	9.0	9.5	9.5	16.0	22.0	24.0	22.0	21.0	18.0	19.0	19.0
60	4.5	6.5	7.0	7.0	6.5	6.0	6.0	6.5	8.5	12.0	13.0	13.0	12.0	11.0	11.5	11.5	17.0	24.0	26.0	26.0	24.0	22.0	23.0	23.0
70	5.0	7.0	8.0	8.0	7.5	7.0	7.5	7.5	9.0	13.0	14.0	15.0	13.5	13.0	13.5	13.5	18.0	26.0	28.0	30.0	27.0	26.0	27.0	27.0
80	5.5	8.0	8.5	9.0	8.5	8.0	8.5	8.5	9.5	14.0	15.0	17.0	15.0	15.0	15.5	15.5	19.0	28.0	30.0	34.0	30.0	30.0	31.0	31.5
90	6.0	8.5	9.5	9.5	9.5	9.0	9.5	9.5	10.0	15.0	16.0	18.0	17.0	17.0	18.0	18.0	20.0	30.0	32.0	36.0	34.0	34.0	36.0	36.0
100	7.5	9.0	10.0	10.5	10.5	10.0	10.5	10.5	10.5	16.0	17.0	19.0	19.0	19.0	20.0	20.0	21.0	32.0	34.0	38.0	38.0	38.0	40.0	40.0

Table 2ii- Number of Skew Fast per m² required to resist Sliding Loads

FOR ROOFS WITH STOP-BATTENS

Laid Tile Weights kg/m ²	Insulation Thickness 36 - 50 mm								Insulation Thickness 51 - 75 mm								Insulation Thickness 76 - 150 mm							
	Roof Pitch								Roof Pitch								Roof Pitch							
	20°	30°	40°	50°	60°	70°	80°	90°	20°	30°	40°	50°	60°	70°	80°	90°	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	3.0	4.0	4.0	3.0	2.0	1.0	1.0	1.0	5.5	7.5	7.0	5.5	4.0	2.0	2.0	2.0
20	3.5	4.5	4.5	4.0	3.0	2.0	2.0	2.0	3.5	4.5	4.5	4.0	3.0	2.0	2.0	2.0	6.0	8.5	8.0	7.0	5.5	3.5	3.0	3.0
30	3.5	5.0	5.0	5.0	4.0	3.0	3.0	3.5	3.5	5.0	5.0	5.0	4.0	3.0	3.0	3.5	6.5	9.0	9.5	8.5	7.0	5.5	5.0	4.0
40	4.0	5.5	6.0	5.5	5.0	4.0	4.0	4.5	4.0	5.5	6.0	5.5	5.0	4.0	4.0	4.5	7.5	10.0	10.5	10.0	9.0	7.0	7.0	6.0
50	4.5	6.0	6.5	6.5	5.5	5.0	5.0	5.0	4.5	6.0	6.5	6.5	5.5	5.0	5.0	5.0	8.0	11.0	12.0	11.5	10.5	9.0	8.5	8.0
60	4.5	6.5	7.0	7.0	6.5	6.0	6.0	6.5	4.5	6.5	7.0	7.0	6.5	6.0	6.0	6.5	8.5	12.0	13.0	13.0	12.0	10.5	10.5	9.5
70	5.0	7.0	8.0	8.0	7.5	7.0	7.5	7.5	5.0	7.0	8.0	8.0	7.5	7.0	7.5	7.5	9.0	13.0	14.0	15.0	13.5	11.0	11.0	10.0
80	5.5	8.0	8.5	9.0	8.5	8.0	8.5	8.5	5.5	8.0	8.5	9.0	8.5	8.0	8.5	8.5	9.5	14.0	15.0	17.0	15.0	14.0	13.0	11.0
90	6.0	8.5	9.5	9.5	9.5	9.0	9.5	9.5	6.0	8.5	9.5	9.5	9.5	9.0	9.5	9.5	10.0	15.0	16.0	18.0	17.0	16.0	14.0	12.0
100	7.5	9.0	10.0	10.5	10.5	10.0	10.5	10.5	7.5	9.0	10.0	10.5	10.5	10.0	10.5	10.5	10.5	16.0	17.0	19.0	19.0	17.0	16.0	15.0

Table 3 - Densities of Skew Fast per m² for Different Fixing Centres

Fixing Centres for Counterbattens or Tile Battens Gauge mm	Counterbatten / Rafter Centres mm			
	400	450	600	1200
100	25.0	22.0	16.6	8.0
125	20.0	17.5	13.0	6.5
150	16.5	14.5	11.0	5.5
175	14.0	12.5	9.5	4.5
200	12.5	11.0	8.0	4.0
225	11.0	9.5	7.0	3.5
250	10.0	8.5	6.5	3.0
275	9.0	8.0	6.0	3.0
300	8.0	7.0	5.5	2.5
325	7.5	6.5	5.0	2.5
350	7.0	6.0	4.5	2.0
375	6.5	5.5	4.5	2.0
400	6.0	5.5	4.0	2.0

Notes:

1. For insulation thickness of less than 36 mm, the 36-50 mm insulation thickness figures may be halved.
2. Calculations can also be performed online:
www.targetfixings.com/skewfastcalc

