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## Information document

### **Mechanical fixings for rigid polyisocyanurate (PIR) and polyurethane (PUR) roofboards beneath single-ply waterproofing membranes**

The purpose of this document is to define the positioning of mechanical fixings for securing rigid polyisocyanurate and polyurethane roofboards to a deck, when the roofboards are to be used in combination with single-ply waterproofing either mechanically fixed or adhered membranes.

The fixing patterns and density described in figure 1 should be considered as the minimum requirement to secure the board. They are not intended to override the requirements of BS EN 1991-1-4<sup>(Ref 1)</sup> used with the UK National Annex<sup>(Ref 2)</sup> which should be considered independently of these guidelines. The manufacturers of the single-ply membranes to be used in conjunction with the PIR or PUR roofboards will likewise have their own requirements for securing their membrane. These requirements will normally need to be met quite additionally to roofboard fixings. Fixings which act as securement for the weather proofing membrane may only be used to substitute the roofboard fixings when their pattern, size and locations coincide exactly.

The following recommendations are intended to assist designers and contractors to achieve uniform restraint of the roofboard over its full area. However, the number of fixings will vary with the geographical location of the building, the topographical data and the height and width of the roof concerned.

#### **Fixing location**

PIR and PUR roofboards are normally manufactured with a width of 1200 mm and a length varying from 600 mm to 3000 mm according to the intended application or manufacturer.

All fixings and washers should be sited >50 mm and <150 mm from the edges and corners of the board and not overlap board joints.

#### ***For mechanically fixed insulation attachment in combination with a mechanically fixed membrane:***

A thermally broken sleeve with a minimum 50 mm diameter washer or a square stress plate of minimum dimension 50x50 mm should be used in combination with a fastener suitable for the board thickness and deck type.

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**For mechanically fixed insulation attachment in combination with an adhered membrane:**

A thermally broken sleeve with a minimum 75 mm diameter washer or a square stress plate of minimum dimension 70x70 mm should be used in combination with a fastener suitable for the board thickness and deck type.

If thermally broken fixings are not used, thicker insulation will be necessary to meet the required U-value.

Where the minimum requirement to secure the boards is proposed wind load calculations should be undertaken in order to determine fastener requirements in corner, perimeter and field roof areas. These areas should be clearly defined, especially where different numbers of fasteners are required for each section.

The pitches / centres of the crown flats of metal decking sheets may influence the location of fixings along the long edges of the boards.

On profiled metal decks, boards should be installed with the long edge at right angles to the troughs of the decking and with end joints staggered. All short edges must be fully supported on the crown of the flats of the deck profile.

**Number of fixings per board size for mechanically fastened insulation and membrane.**

Board size (mm)	Number of fixings			
	Minimum required	Rate/m <sup>2</sup>	Maximum required <sup>4</sup>	Rate/m <sup>2</sup>
1200 x 600	4	5.55	4	5.55
1200 x 1200	4	2.77	6	4.17
1200 x 2400	6	2.08	11	3.82
1200 x 3000	8	2.22	12	3.33

Notes:

1. The above fixing guidance is applicable where both the membrane and insulation are to be mechanically fastened.
2. A wind uplift calculation (Refs 1 and 2) is required to calculate the actual number of fixings required per roof zone for each project undertaken. The minimum required number of insulation fasteners indicated above will therefore increase for exposed locations.
3. The number of insulation fasteners per board in any wind zone need not exceed the maximum number indicated for each board size, however, contractors may choose to install the corner zone required number of fasteners across the complete roof area and thereby ignore the need for different patterns in each zone for ease and speed of application.
4. Where the insulation is mechanically fastened and the membrane is adhered, the maximum number of fasteners per board in the above table shall not apply. In this instance the number of fasteners per board will be defined by the wind load calculation.

**References**

1. BS EN 1991-1-4:2005+A1:2010  
Eurocode 1. Actions on structures. General actions. Wind actions
2. NA to BS EN 1991-1-4:2005+A1:2010  
UK National Annex to Eurocode 1. Actions on structures. General actions. Wind actions

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Figure 1. Typical mechanical fixing patterns

