Built-up Flat Roofing Applications

Flat Roof Insulation

Celotex
Insulation Specialists

Introduction

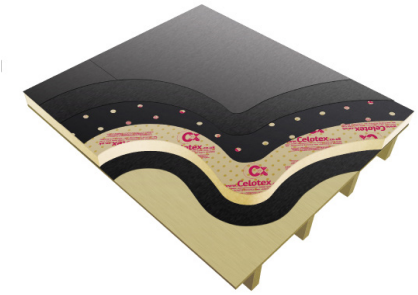
Celotex is the brand leading manufacturer of PIR insulation boards, with its range encompassing the thinnest and thickest boards available to the construction industry today. All of the Company's products are manufactured at its plant in Suffolk from where the dedicated Celotex Technical Centre offers advice and calculations for compliance with current regulations and legislation.

Celotex: We know insulation inside and out.

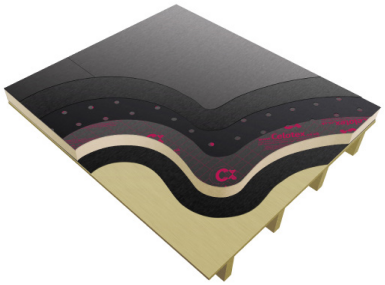
Use Celotex EL3000 or TC3000 high performance insulation in built-up flat roofing applications. Celotex EL3000 and TC3000 are both suitable for use in hot applied bituminous and mastic asphalt waterproofing systems. Celotex TC3000 is also suitable for use in torch-on flat roofing applications.

When designing a flat roof using Celotex EL3000 or TC3000 boards, three basic principles apply:

1. Design to a fall of 1:80, 1:60 or 1:40 as appropriate to the weathering system, type of deck and construction tolerances.
2. Have due regard for the use and design of the building and the need to ensure that the design will not allow for a build up of moisture below the waterproofing membrane.
3. Provide adequate protection for both insulation and waterproofing if significant foot traffic is expected either during or after the completion of the roof.



Celotex EL3000 over timber deck - perforated facer uppermost



Celotex TC3000

Celotex EL3000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
EL3050	50	1.85	2.04
EL3080	80	3.05	3.00
EL3090	90	3.45	3.32
EL3100	100	3.80	3.64
EL3120	120	4.80	4.28
EL3130	130	5.20	4.60
EL3140	140	5.60	4.92
EL3150	150	6.00	5.24

Sustainable Insulation

Celotex PIR insulation has been independently assessed by BRE Global and has been accredited with an A+ rating when compared to the BRE Green Guide.

The results also show that Celotex offers a lower environmental impact than other typical PIR manufacturers.

For further information about Celotex' sustainable insulation solutions, visit the sustainability pages of the website at celotex.co.uk

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Celotex TC3000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
TC3050	50	1.85	2.26
TC3090	90	3.45	3.54
TC3100	100	3.80	3.86
TC3120	120	4.80	4.50
TC3130	130	5.20	4.82
TC3140	140	5.60	5.14
TC3150	150	6.00	5.46

Example U-value Calculation: EL3000/TC3000 - Built-up Roofing

Construction		Concrete Deck		Steel Deck		Timber Deck	
		FB	MF	FB	MF	FB	MF
Outside surface resistance		-	-	-	-	-	-
Built-up rooing		12	12	12	12	12	12
Variable layer		See below	See below	See below	See below	See below	See below
Vapour Control Layer (VCL)		-	-	-	-	-	-
Concrete deck		250	250	n/a	n/a	n/a	n/a
Steel deck		n/a	n/a	1.5	1.5	n/a	n/a
Timber deck plywood		n/a	n/a	n/a	n/a	19	19
Cavity between joist @ 11.7% bridging		n/a	n/a	n/a	n/a	150	150
Plasterboard		n/a	n/a	n/a	n/a	12.5	12.5
Inside surface resistance		-	-	-	-	-	-
Variable layer Celotex Product	Thickness (mm)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)
Celotex EL3000/TC3000	100	0.24	-	0.25	-	0.22	-
Celotex EL3000/TC3000	120	0.19	0.22	0.20	0.23	0.18	0.21
Celotex EL3000/TC3000	130	0.18	0.21	0.18	0.21	0.17	0.20
Celotex EL3000/TC3000	140	0.17	0.19	0.17	0.20	0.16	0.18
Celotex EL3000/TC3000	150	0.16	0.18	0.16	0.19	0.15	0.17

FB = Fully bonded
MF = Mechanically fixed

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Installation Guidelines

Celotex insulation boards should not be installed when the temperature is at or below 4°C and falling.

Hot-applied systems

The felt vapour control layer (VCL) in accordance with BS 6229 should be fully sealed at all laps prior to applying the insulation. At perimeters and abutments the VCL should be turned up around the insulation board edges and a lap of approximately 300mm should be bonded to top surface of the insulation. The VCL should be fully bonded to concrete decks using hot bitumen adhesive, strip-bonded to the ribs of metal decks and partially bonded to timber decks. On timber decks, the VCL may be nailed to the deck but laps should be sealed with the appropriate adhesive.

When used on metal decks Celotex EL3000 boards should be laid with the perforated facer uppermost and the long sides at right angles to corrugations and bonded in a full mop of hot bitumen to the VCL. The torch-on technique is not suitable with EL3000 and should only be carried out on Celotex TC3000 boards.

Three layer felt system using torch-on technique

- The felt vapour control layer (VCL) in accordance with BS 6229 should be fully bonded to the deck prior to the installation of the insulation.
- Bond the boards to the VCL and lay the insulation with joints break-bonded. Alternatively the boards can be mechanically fixed to the deck.
- Loose lay the venting layer directly over the insulation boards.
- Torch-on the underlay sheet over the venting layer and to finish torch the mineral surface cap sheet to the underlay.
- To ensure the best possible bond, the torch-on technique should apply 60% of the flame to the board with 40% to the felt.

Celotex TC3000 is also compatible with pour and roll and mastic asphalting installation techniques. Please contact the Celotex Technical Centre for installation guidance using these techniques.

Mechanical fastening

The boards should be laid with all joints tightly butted over the VCL and then mechanically secured through to the deck. When used on metal decks, these roof boards should be laid with the long edges at right angles to the corrugations. When mechanical fasteners are utilised, they should be selected to suit the type of deck used. Celotex recommends the use of thermally broken fixings. Fixings must have a minimum 50mm head or plate washer diameter. Fixings should be installed between 50mm – 150mm from the edges and corners of the board.

The exact number of fixings required for each zone on a flat roof must be calculated by the use of either BS 6399: Part 2: 1997 Code of Practice for Wind Loads or EN 1991-1-4 used with the UK National Annex. A minimum of six fixings per board must be used. Where more than six fixings per board are required by the wind uplift calculation, the higher figure must be adopted.

Further guidance on fixings and patterns can be obtained from fixing manufacturers and in the BRUFMA information document on mechanical fixings for rigid PIR roof boards.

Installation of weathering systems

Different types of weathering systems require different installation instructions and guidelines. Advice on the installation of these weathering systems should be sought directly from the manufacturer or provider of the weathering system type.

Laying pattern

It is recommended that the boards are laid with joints break-bonded.

Supporting deck

The supporting deck must provide adequate support for the VCL and insulation board with joints being supported by the ridges of the deck. It must be capable of supporting the static and dynamic design loads and the loads associated with the construction activity without deflection in excess of the limits defined in BS 6399: Part 1. The deck must be structurally sound, dry, clean and where necessary primed before application of the weathering and insulating system.

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Trafficking

Boards are capable of withstanding the associated foot traffic with normal roof laying work. However, roofs are generally designed for occasional lightweight foot traffic or maintenance access. Where more frequent or heavier access is required, protective walkways should be provided. Under no circumstances should the roof be used as a working platform, either during or after the construction programme. Extra care should be taken to protect the insulation and weathering when ballasting.

Loose-laid roof boards under ballasted systems

When the ballasting system is not installed immediately following the application of loose-laid roof boards, additional attachment is required. Please refer to BRUFMA Information Document "Securing PIR & PUR Roof Boards beneath Single-Ply Waterprooing Membranes" for further information.

Use of adhesives

When using adhesives, the installer should take care not to use products that contain chemicals likely to attack the insulating foam such as ketonic solvents. Celotex EL3000 and TC3000 contain no chemicals or solvents likely to damage the PVC membrane. When using adhesives, the installer should check the compatibility of the adhesive with the adhesive manufacturer.

Further Information

If you wish to contact Celotex , please visit celotex.co.uk and click on the 'contact us' page.

For information regarding storage, installation and handling of Celotex products, or for Health and Safety advice, please refer to the 'literature' pages of the website at celotex.co.uk

Celotex has a policy of continuous product development and reserves the right to alter product designs or specifications without prior notice.

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Information is correct at date of publication - August 2013
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