

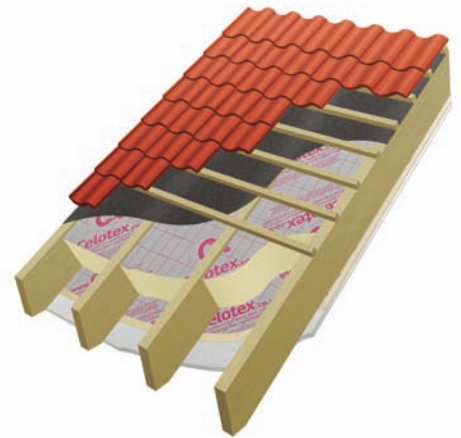
Between and under rafter applications

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 TB4000**, **Celotex GA4000** and **Celotex XR4000** high performance thermal insulation in pitched roof between and under rafter applications to minimise insulation thickness and give the following benefits:

- Ideal for use with shallow rafters
- Provides reliable long term energy savings for buildings
- Minimised additional loading to the structure
- Dimensionally stable
- Ideal for loft conversions / room in roof applications
- Upgrade existing ceilings to current standards



Celotex XR4000 & TB4000

Celotex TB4000 Technical Data

Product Code	Thickness (mm)	R-value (m ² K/W)	Weight (kg/m ²)
TB4012	12	0.50	0.50
TB4020	20	0.90	0.72
TB4025	25	1.10	0.85
TB4030	30	1.35	0.98
TB4035	35	1.55	1.11
TB4040	40	1.80	1.26
TB4045	45	2.00	1.40

Celotex GA4000 Technical Data

Product Code	Thickness (mm)	R-value (m ² K/W)	Weight (kg/m ²)
GA4050	50	2.25	1.55
GA4055	55	2.50	1.68
GA4060	60	2.70	1.90
GA4065	65	2.95	2.05
GA4070	70	3.15	2.19
GA4075	75	3.40	2.34
GA4080	80	3.60	2.48
GA4085	85	3.85	2.62
GA4090	90	4.05	2.76
GA4095	95	4.30	2.90
GA4100	100	4.50	3.27

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 2008.

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



Celotex XR4000 Technical Data

Product Code	Thickness (mm)	R-value (m ² K/W)	Weight (kg/m ²)
XR4110	110	5.00	3.58
XR4120	120	5.45	3.88
XR4130	130	5.90	4.19
XR4140	140	6.35	4.49
XR4150	150	6.80	4.79
XR4165	165	7.50	5.43
XR4200	200	9.05	6.53



For premium performance including Class O fire performance Celotex FR4000 is suitable for this application.

Example U-value Calculation: unventilated between and under rafters

Construction		100mm deep rafters Thickness (mm)	125mm deep rafters Thickness (mm)	150mm deep rafters Thickness (mm)
Outside surface resistance		-	-	-
Tiling including batten space		-	-	-
Breather membrane		-	-	-
Low E cavity, between rafters (11.7% brg)		20	25	30
Celotex between rafters @ 400 ctrs (11.7% brg)		GA4080	GA4100	XR4120
Variable layer (for below rafters)		See below	See below	See below
Low E cavity batten (see note 1)		25	25	25
Plasterboard		12.5	12.5	12.5
Inside surface resistance		-	-	-
Celotex Product - Variable layer	Thickness (mm)	U-value (W/m ² K)	U-value (W/m ² K)	U-value (W/m ² K)
Celotex TB4000, under rafter †	12	-	-	0.20
Celotex TB4000, under rafter †	20	-	-	0.18
Celotex TB4000, under rafter †	25	-	0.20	0.17
Celotex TB4000, under rafter †	30	-	0.19	0.17
Celotex TB4000, under rafter †	35	0.20	0.18	0.16
Celotex TB4000, under rafter †	40	0.19	0.17	0.15
Celotex TB4000, under rafter †	45	0.18	0.16	0.15
Celotex GA4000, under rafter †	50	0.18	0.16	0.14
Celotex GA4000, under rafter †	55	0.16	0.14*	0.13*
Celotex GA4000, under rafter †	60	0.15	0.14*	0.13
Celotex GA4000, under rafter †	65	0.15	0.13*	0.12*
Celotex GA4000, under rafter †	70	0.14	0.13*	0.12*
Celotex GA4000, under rafter †	75	0.14	0.13	0.12
Celotex GA4000, under rafter †	80	0.13	0.12*	0.11*
Celotex GA4000, under rafter †	85	0.13	0.12*	0.11*
Celotex GA4000, under rafter †	90	0.13	0.12	0.11*
Celotex GA4000, under rafter †	95	0.12	0.11*	0.11
Celotex GA4000, under rafter †	100	0.12	0.11*	0.10*

Note 1: Use 25mm x 47mm batten to create a low emissivity cavity space

* This thickness of board is recommended to be fixed using 25mm x 47mm batten to allow a suitable construction detail.

† Joints taped as VCL

U-value

For U-values see **variable layer list**, or for more options, refer to our online U-value calculator at celotex.co.uk

Example U-value Calculation: ventilated between and under rafters

Construction		100mm deep rafters Thickness (mm)	125mm deep rafters Thickness (mm)	150mm deep rafters Thickness (mm)
Outside surface resistance		-	-	-
Tiling including batten space		-	-	-
Sarking felt		-	-	-
Ventilated cavity		50	50	50
Celotex between rafters @ 400 ctrs (11.7% brg)		GA4050	GA4075	GA4100
Variable layer (for below rafters)		See below	See below	See below
Low E cavity batten space See note 1		25	25	25
Plasterboard		12.5	12.5	12.5
Inside surface resistance		-	-	-
Celotex Product - Variable layer	Thickness (mm)	U-value (W/m ² K)	U-value (W/m ² K)	U-value (W/m ² K)
Celotex TB4000, under rafter	20	-	-	-
Celotex TB4000, under rafter	25	-	-	-
Celotex TB4000, under rafter	30	-	-	0.20
Celotex TB4000, under rafter	35	-	-	0.19
Celotex TB4000, under rafter	40	-	-	0.19
Celotex TB4000, under rafter	45	-	-	0.18
Celotex GA4000, under rafter	50	-	0.18	0.16
Celotex GA4000, under rafter	55	0.20*	0.17*	0.15*
Celotex GA4000, under rafter	60	0.19*	0.17*	0.15*
Celotex GA4000, under rafter	65	0.19*	0.16*	0.14*
Celotex GA4000, under rafter	70	0.18*	0.16*	0.14*
Celotex GA4000, under rafter	75	0.17*	0.15*	0.13*
Celotex GA4000, under rafter	80	0.17*	0.15*	0.13*
Celotex GA4000, under rafter	85	0.16*	0.14*	0.13*
Celotex GA4000, under rafter	90	0.15*	0.14*	0.12*
Celotex GA4000, under rafter	95	0.15*	0.13*	0.12*
Celotex GA4000, under rafter	100	0.14*	0.13*	0.12*

GA = Celotex GA4000 Low E = Low emissivity VCL = Vapour control layer

Note 1: Use 25mm x

47mm battens to create a low emissivity cavity space.

*** This thickness of board is recommended to be fixed using 25mm x 47mm battens to allow a suitable construction detail.**

U-value

For U-values see **variable layer list**, or for more options, refer to our online U-value calculator at celotex.co.uk

Installation Guidelines

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

Installation guidelines: ventilated

- Make sure there is enough rafter depth to accommodate not only the thickness of the Celotex insulation but also a 50mm ventilated airspace above the boards.
- Fix battens to the inside face of the rafter so that the bottom of the batten is 50mm below the sarking felt.

Installation guidelines: unventilated

- Install the breather membrane over the rafters by either fixing battens to the sides of the rafters and allowing the membrane to sag between the rafters, or by fixing counter battens over the membrane, leaving the entire rafter depth to be filled with insulation. All details are to be in accordance with the membrane manufacturer's recommendations.

Installation Guidelines (cont)

Installation guidelines: ventilated and unventilated

- Measure the space to be filled between the inside face of the rafter prior to cutting the board.
- Use the **Celotex Insulation Saw** to cut the boards at a slight angle, making the board width slightly oversized on one surface to achieve a 'friction fit'. **Celotex Insulation Clips** should also be used to hold the board in place (for further information about the **Celotex Insulation Clip** and its use, visit the 'literature' pages of the website at celotex.co.uk and download the product datasheet).
- Push the boards into the void between the rafters until they are tight up to the battens or the membrane, ensuring that lateral joints are closely butted. Secure the second layer of Celotex insulation to the underside of the rafters with broad-headed clout nails. Joints between boards must be tightly butted.
- Seal the board joints with **Celotex Insulation Tape**. Vapour seal all perimeter abutments using sealant.
- Nail or screw plasterboard or other lining through the insulation to the rafter, ensuring that the length of the fasteners is adequate to secure the plasterboard lining.
- Alternatively, fit softwood battens to the underside of the insulation fixed through to the rafters, and then fix the plasterboard directly to the batten. This also provides a void for lighting cables/conduit.

Certifications and Accreditations

Celotex products TB4000, GA4000 and XR4000 are covered by BBA Agreement Certificate No 95/3197. To download a copy of this certificate, visit the 'literature' pages of the website at celotex.co.uk

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.

*Calls to the Celotex Technical Centre are charged at 30p per minute from a BT landline and lines are open Monday - Friday from 8.00am - 5.15pm. Details are correct at date of publication - January 2011

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