Garage Conversion - Between and Under Joist Applications

Flat Roof Insulation

Celotex
Insulation Specialists

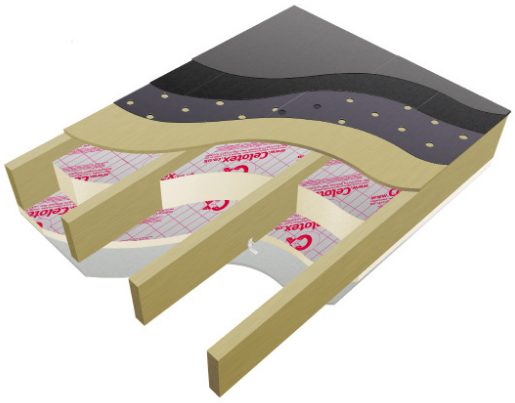
Introduction

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 a combination of Celotex GA4000 or Celotex XR4000 with Celotex PL4000 high performance plasterboard thermal laminate in flat roof between and under joist applications to minimise insulation thickness and give the following benefits:

- Achieves compliance to Building Regulations whilst ensuring thin solutions
- Create additional, highly thermal efficient living space
- A perfect solution to upgrade older buildings
- Provides reliable long term energy savings for buildings
- Garage conversions deliver multiple energy efficient measures within one project



Celotex XR4000 & PL4000

Celotex GA4000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
GA4050	50	2.25	1.55
GA4055	55	2.50	1.74
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
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.

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 XR4000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
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

Celotex PL4000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
PL4015	15 + 9.5	0.70	6.62
PL4025	25 + 12.5	1.20	9.06
PL4040	40 + 12.5	1.85	9.52
PL4045	45 + 12.5	2.10	9.67
PL4050	50 + 12.5	2.30	9.83
PL4055	55 + 12.5	2.55	10.01
PL4060	60 + 12.5	2.75	10.15
PL4065	65 + 12.5	3.00	10.30

12.5mm tapered edge plasterboard is laminated to the specified insulation thickness
9.5mm tapered edge plasterboard is laminated to PL4015

FR5000

For premium performance including Class O fire performance Celotex FR5000 is suitable for this application.

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Example U-value Calculation: Cold Flat Roof - Between and Under Joists

Construction		100 deep joists Thickness (mm)	125 deep joists Thickness (mm)	150 deep joists Thickness (mm)	175 deep joists Thickness (mm)
Outside surface resistance		-	-	-	-
Weather-proofing system		n/a	n/a	n/a	n/a
Plywood		19	19	19	19
Ventilated cavity		50	50	50	55
Celotex between joists @ 400 ctrs (11.7% brg)		GA4050	GA4075	GA4100	XR4120
Variable layer (for below joists)		See below	See below	See below	See below
Inside surface resistance		-	-	-	-
Celotex Product - Variable layer	Thickness (mm)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)	U-value (W/m²K)
Celotex PL4000	15 + 9.5	-	-	-	-
Celotex PL4000	25 + 12.5	-	-	-	0.19
Celotex PL4000	40 + 12.5	-	-	0.19	0.17
Celotex PL4000	45 + 12.5	-	-	0.18	0.16
Celotex PL4000	50 + 12.5	-	0.20	0.17	0.15
Celotex PL4000	55 + 12.5	-	0.19	0.16	0.15
Celotex PL4000	60 + 12.5	-	0.18	0.16	0.14
Celotex PL4000	65 + 12.5	0.20	0.17	0.15	0.14

Installation Guidelines

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

- Make sure that there is enough joist 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 joists so that the bottom of the batten is 50mm below the decking.
- Measure the space to be filled between the inside face of the joists prior to cutting the board.
- The Celotex Insulation Clip is designed to allow insulation boards to be installed between timber joists quickly and without nails or screws.
- Fit the clips at one metre maximum centres along the insulation.
- Push the boards into the void between the joists until they are tight up to the underside of stop battens, ensuring that the lateral joints are tightly butted.
- Secure Celotex PL4000 to the underside of the joists.
- Joints between the boards must be tightly butted, taped and jointed using appropriate tape and jointing material to create the vapour control layer.

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Composite systems can be used to combine Celotex insulation under joist lining with quilt type insulant between the joists which will provide acoustic, as well as thermal insulation. This option is particularly useful when upgrading to modern acoustic insulation standards.

When updating an existing ceiling, Celotex PL4000 can be fitted directly underneath the ceiling, providing there is no vapour check layer such as gloss paint or foil backed plasterboard. Always ensure that there is a 50mm minimum ventilation gap above any original insulation.

Ventilation must be provided above an insulated ceiling directly through the cold void. Failure to do so could result in serious condensation problems that may lead to decay and possible failure.

Further Information

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Garage Conversion - Concrete Slab Floor Applications

Floor Insulation

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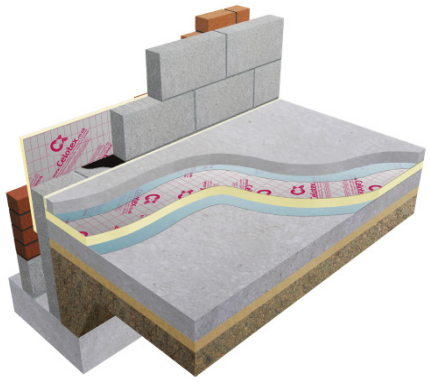
Celotex: We know insulation inside and out.

Use Celotex GA4000, Celotex XR4000 or Celotex FF4000 high performance thermal insulation in concrete slab floor applications to minimise insulation thickness and give the following benefits:

- Easy to cut boards to fit in most spaces
- Provides reliable long term energy savings for buildings
- Excellent dimensional stability
- No thermal bridging at floor edges
- Tightly butted joints for insulation continuity



Celotex GA4000 over slab with screed

Celotex GA4000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
GA4050	50	2.25	1.55
GA4055	55	2.50	1.74
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
GA4100	100	4.50	3.27

Celotex XR4000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
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

FR5000

For premium performance including Class O fire performance Celotex FR5000 is suitable for this application.

Sustainable Insulation

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

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Garage Conversion - Concrete Slab Floor Applications

Floor Insulation

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Example U-value Calculation: Ground Floor - Concrete Slab

Celotex Product	Thickness (mm)	Perimeter / Area Ratio 0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
GA4000 / FF4000	50	0.12	0.18	0.22	0.25	-	-	-	-	-	-
GA4000	55	0.12	0.17	0.21	0.22	0.24	0.25	-	-	-	-
GA4000	60	0.12	0.17	0.20	0.21	0.23	0.24	0.24	0.25	-	-
GA4000	65	0.11	0.16	0.19	0.20	0.21	0.22	0.23	0.24	0.24	0.25
GA4000 / FF4000	70	0.11	0.15	0.18	0.19	0.20	0.21	0.22	0.23	0.23	0.23
GA4000 / FF4000	75	0.11	0.15	0.17	0.18	0.20	0.20	0.21	0.21	0.22	0.22
GA4000	80	0.11	0.14	0.16	0.18	0.19	0.19	0.20	0.20	0.21	0.21
GA4000 / FF4000	85	0.10	0.14	0.16	0.17	0.18	0.19	0.19	0.20	0.20	0.20
GA4000 / FF4000	90	0.10	0.13	0.15	0.16	0.17	0.18	0.18	0.19	0.19	0.19
GA4000	95	0.10	0.13	0.15	0.16	0.17	0.17	0.18	0.18	0.18	0.18
GA4000 / FF4000	100	0.10	0.13	0.14	0.15	0.16	0.17	0.17	0.17	0.17	0.18
XR4000	110	0.09	0.12	0.13	0.14	0.15	0.15	0.16	0.16	0.16	0.16
XR4000	120	0.09	0.11	0.13	0.13	0.14	0.14	0.15	0.15	0.15	0.15
FF4000	125	0.09	0.11	0.12	0.13	0.14	0.14	0.14	0.14	0.15	0.15
XR4000	130	0.08	0.11	0.12	0.13	0.13	0.14	0.14	0.14	0.14	0.14
XR4000	140	0.08	0.10	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.13
XR4000	150	0.08	0.10	0.11	0.11	0.12	0.12	0.12	0.12	0.13	0.13
XR4000	165	0.07	0.09	0.10	0.11	0.11	0.11	0.11	0.11	0.12	0.12
XR4000	200	0.07	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10

Based on 65mm screed and 20mm insulation as perimeter upstand

Installation Guidelines

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

Over slab installation guidelines

- Install a damp proof membrane below the Celotex. This can either be over the top or below the slab. The damp proof membrane must provide continuity with the damp proof course in the surrounding walls.
- Level the surface of the slab; it should be smooth and free of projections.
- If required, use a thin layer of sand blinding on a rough, tamped slab to ensure that the insulation boards are continuously supported.
- Use the Celotex Insulation Saw to cut and fit insulation upstand to floor perimeter, to meet a minimum R-value of 0.75m²K/W, (i.e. Celotex TB4020). The upstand depth should be equal to the sum of the slab insulation and the screed thickness. The upstand thickness should not exceed the combined thickness of the wall linings.
- Lay the insulation boards directly onto the prepared slab with all joints tightly butted.
- Lay a polythene vapour control layer (VCL) over the insulation to minimise the risk of condensation forming at the insulation/slab interface and to prevent liquid screed migration.
- Apply a sand/cement or self levelling screed over the VCL and Celotex insulation boards to a minimum thickness of 65mm.

cont...

Installation Guidelines (cont)

Use scaffold boards or other protection to prevent wheelbarrows and other traffic damaging the insulation.

These recommendations are suitable for normal domestic floor loadings. If higher loadings are required, it may be necessary to increase the screed thickness and provide reinforcement within the screed. Consult a structural engineer or a specialist flooring contractor.

Under slab installation guidelines

- Level hardcore and blind with sand
- Install damp proof membrane and lap into damp proof course
- Use the Celotex Insulation Saw to cut and fit insulation, thickness to achieve required U-value
- Use the Celotex Insulation Saw to cut and fit insulation upstand to floor perimeter, to meet a minimum R-value of 0. 75m²K/W, (i.e. Celotex TB4020). Height of insulation to coincide with required finished floor level.
- Lay a polythene vapour control layer (VCL) over the insulation to minimise the risk of condensation forming at insulation/slab interface.
- Lay concrete to required finished floor level and smooth over with float finish.

Chipboard floor finish

A VCL should be laid over the Celotex insulation boards and turned up 100mm at room perimeters, behind the skirting. It is recommended good practice that all joints should be lapped 150mm and sealed.

The chipboard must be minimum 18mm tongued and grooved flooring grade type C4 to BS 5669. Lay the chipboard with staggered joints, glued with a woodworking adhesive.

Provide a 10mm–12mm gap at all perimeters and abutments to allow for expansion. This can be achieved by the use of temporary wedges.

Where chipboard is butted together without a tongued and grooved joint and all external doorways (for the width of the threshold), a treated timber batten must be used in lieu of the insulation boards.

Certifications and Accreditations

Celotex products GA4000, XR4000, FR5000 and FF4000 are covered by BBA Agrement Certificate No 95/3197. To download a copy of this certificate, visit the 'literature' pages of the website at celotex.co.uk

Further Information

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Garage conversion - Solid Brick Wall

Wall Insulation

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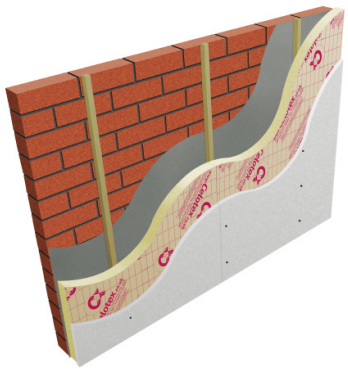
Use Celotex PL4000 high performance thermal insulation in solid brick walls in garage conversions to minimise insulation thickness and give the following benefits:

- Achieve compliance with Building Regulations whilst ensuring thin solutions
- Create additional, highly thermal efficient living space
- Provide reliable long term energy and cost savings
- Garage conversions deliver multiple energy efficient measures within one project



Celotex PL4000

Celotex PL4000 Technical Data

Product Code	Thickness (mm)	R-value (m²K/W)	Weight (kg/m²)
PL4015	15 + 9.5	0.70	6.62
PL4025	25 + 12.5	1.20	9.06
PL4040	40 + 12.5	1.85	9.52
PL4045	45 + 12.5	2.10	9.67
PL4050	50 + 12.5	2.30	9.86
PL4055	55 + 12.5	2.55	10.01
PL4060	60 + 12.5	2.75	10.15
PL4065	65 + 12.5	3.00	10.30

12.5mm tapered edge plasterboard is laminated to the specified insulation

Sustainable Insulation

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

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Garage conversion - Solid Brick Wall

Wall Insulation

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Example U-value Calculation: Garage Conversion - Solid Brick Wall

Construction		Thickness (mm)
Outside surface resistance		-
Brick wall		103
Breathable membrane		-
Cavity between battens		25
Variable layer		See below
Board joints sealed to form VCL		-
Inside surface resistance		-
Variable Layers Celotex Product	Thickness (mm)	U-value (W/m²K)
Celotex PL4000	60 + 12.5	0.30
Celotex PL4000	65 + 12.5	0.28

Installation Guidelines

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

- Ensure any non-breathable coverings are removed, e.g. vinyl wallpaper or gloss paint.
- To prevent external moisture crossing over to the inner lining install a breathable membrane against the wall according to manufacturer's instructions.
- Fix with suitable fixings 25mmx47mm battens to the masonry at 600mm vertical centres to coincide with the board edges. Specific advice on suitable fixings should be sourced directly from the fixing manufacturer.
- Celotex PL4000 is then mechanically fixed to the battens using suitable fixings.
- Joints between the boards should be tightly butted and finished by taping and jointing using appropriate tape and jointing material to create the VCL

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